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[Founded in 1849 as the "Journal of Gas Lighting."]

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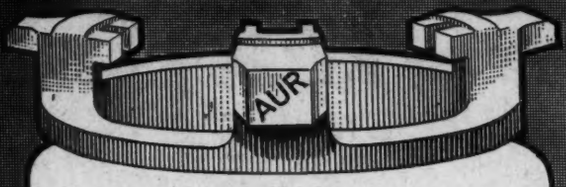

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLVIII., No. 2943.] TUESDAY, OCTOBER 7, 1919. [71ST YEAR.

EDITORIAL NOTES.

The Strike Ended.

THE news spread speedily through the country on Sunday evening that a settlement had been effected in the railway strike; but, while the feeling of relief was great, there was a general disposition to wait for information as to the terms of settlement before pronouncing any opinion as to whether, in the interests of the country, the Government had done the right thing. Now that the country has the terms, it is necessary in considering them to keep well in mind certain points affecting the origin of the strike; and then it will be seen that, in stabilizing wages until Sept. 30 of next year, and in guaranteeing that no adult railwayman shall receive less than 51s. so long as the cost of living is not less than 110 p.ct. above the pre-war level, with the subsidiary conditions, the Government have not receded from the position they took up, and which the nation so solidly endorsed. In the first place, it will be remembered that the railway strike originated over the question of standardizing the wages of the grades of workers lower than those of the engine drivers, firemen, and cleaners. The Government set out upon this work of standardization on the principle that consideration should be given to each grade upon its merits. They have not receded from this position. The strike was called because of the refusal of the Government to apply to the lower grades of workers the principle that they had applied in standardizing the wages of the locomotive men, whose responsibility is far and away in excess of that of any other grade. The Government have not given way upon that point. Then, thirdly, the Government stipulated, after the strike had started, that negotiations on the matter in dispute should not be resumed until the men returned to work. To that condition there has been strict adherence. The time concessions stabilizing wages for an additional period have nothing whatever to do with the matter that originated the strike; and the money involved is really immaterial when one considers that there are no signs of the cost of living being immediately reduced. The men claim the agreement as a victory; there can be no "victory" with the point over which the strike took place in *status quo*. If anybody can claim a victory, it is the Government and the country at large over the revolutionary forces that were really at the bottom of this attack upon the nation, and which has done immeasurable injury to its interests. The leaders have had something conceded external to the real issue to offer their men—nothing more. But there can be no doubt that what has happened during the strike and the recent Yorkshire miners' strike will have a moderating effect upon the labour ultraists whose objective was the destruction of democratic government and the installation in its place of labour domination, and that of a boundlessly mischievous kind. It will take some time to move from traffic disorganization to normal conditions; and it will be impossible to repair the losses that disorganization has occasioned. However, after all, perhaps the country will be the gainers from the lessons that intelligent labour unionists will reap from what has happened. The articles relating to the strike which succeed this one were in type before the settlement.

The Nation and the Strike.

THE past week has witnessed a great triumph of energy and determination on the part of the nation. The nation as a whole is resolved to be master in its own house; and while willing to see that justice is done to all constituent parts of the community, it does not intend to be governed by any trade faction. The National Union of Railwaymen made the fundamental error of ignoring the existence of the nation; and so the nation has reminded the Union of its existence, and that it has a will of its own, which it is prepared to preserve. The Union could not have gone to work in a better way than they have done to inflame public indignation, and to brace-up a general resolve to see this thing through now that the gage has been thrown down. Public opinion is an excellent arbiter; and even had public opinion decided that the railwaymen had a genuine grievance (which they had not), it would have been against them over the manner in which their Executive sought to enforce their claims, and to obtain a rapid victory for their policy.

The lightning strike momentarily disorganized the country; but then there went out a mighty effort which, in its turn, patently soon shook the confidence of the Union leaders in the efficacy of their strategy, and made other Union leaders hesitate seriously who would otherwise in all probability at once have put their weight into the balance with the railway men. People everywhere took the matter very philosophically, and made up their minds to any amount of inconvenience in order to support the Government in a line of action which it was agreed was soundly fair. That is the popular verdict; and the railway men know it. And they are not particularly happy over it, nor are their leaders, although through the week the latter have been doing all they can to win some part of public favour, to keep the men out, and—all-important to them individually—to save their own faces. We are, however, getting to be a more skilled nation than was at one time of day the case; and it required this strike to give the Unions a convincing illustration of the fact. There are hundreds of thousands of men who have been in the army who are not trade unionists, but who have learnt how to do things they had never done before. There are drivers galore for transport; and there are men who have learnt they can do rough and heavy work as well as work with their brains. There are engineers by the thousands who have been through the workshops, and who require comparatively little training to handle a locomotive or to drive an electric train. The people of London particularly are under deep obligation to the volunteer electrical engineers who came forward, and during the week drove countless people to and from business by the electric services. The Government have not lacked volunteers. They came from all parts of our social system; and the latent power of the country to fill the places of strikers or malcontents has been a wonderful revelation. Should there, unfortunately, be another strike, the country would know better its innate power, and would be better organized to meet it than it was on this occasion, though even this time it has speedily found ways of easing the position in the matter of conveyance, and protecting the community in regard to food supply. Had it not been for all this rapid marshalling of latent power, other unions would undoubtedly have rushed into the struggle, and tried to make it a sharp and short one in favour of the National Union of Railwaymen. They may come in now as a last resort in an attempt to intimidate the country, and to bring what they consider would be overwhelming pressure to bear on the Government. But trade unionism has been impressed; and trade unionism (which has a right to a place, and has a useful place when it is well directed, in our country's system) is not composed entirely of extremists and fools. In its ranks are men of great intelligence and patriotic to the backbone. These now recognize, as trade unionism generally has to recognize, that when it turns upon the nation, the nation is

not what it once was—that the unions have not a monopoly of skill, but outside their ranks there is a reserve of skill equal to their own which enables the nation to carry on.

As is usually the case in a struggle of this kind, there has been a great deal of misrepresentation on the part of those who forced the strike—and forced it against the wishes of a large proportion of the rank-and-file, but the greater part of whom nevertheless felt it their duty to be loyal to their Union rather than to the country—a strange misconception of a man's moral obligation. But misrepresentation has had its reply, in a plain statement of the true position of the wages of railwaymen. The country is of opinion that the men have had very fair treatment, and will continue to have it. Popular opinion, too, is strongly in support of the Government in refusing, when the men had left work, and had tried to throw the country into chaos under autocratic leadership, to reopen negotiations until the men return to work, and so relieve the Government of the duty of working to alleviate the inconvenience and disorganization, and to ensure adequate feeding of the country, including the half-million or so of strikers. The nation will not forget the dastardly act. It will not forget its inconvenience; it will not forget the force that it was sought to apply; it will not forget the inhuman conduct which left food to perish, horses to starve, and live stock in transit to perish of hunger or be maddened by thirst. Though some men forgot their obligations as men, there were many others who did not, and there was a rush of relief to all this wrong-doing. Attempts were made to wreck trains and to take lives, and to interfere with and injure men who were helping to mitigate the effects of the blow of the railwaymen. And this in a civilized country; and all for the one purpose of attaining selfish ends. These criminal acts will live in memory. It is a grim tale. The material loss to the country has been immense; but the nation has shown that it intends to be dominant in the State. This is what the despots who have been gaining a controlling power in trade unionism, and have been dragging it down from the level of sane and useful purpose to serve revolutionary ends, have begun to realize—tardy although they may be in their acknowledgment of the realization.

Stretch Gas Make to the Utmost.

The Coal Controller was very wise to communicate to gas undertakings, early last week, a supplement to the previous Emergency Order regarding the production of gas from available coal stocks, in view of the cutting-off of supplies through the railway strike other than by sea. The first Order put the limit of gas quality at 425 B.Th.U.; but it was far better to leave to the judgment of the responsible gas men (each knowing his own conditions best) the extent to which they should carry production per ton of coal, in view of the complete uncertainty that surrounds future deliveries. This is not the time for central control in such a matter. Gas engineers are as anxious as the Coal Controller or any member of the Government to defeat the vile machinations of trade union extremists and dictators. There is not only the stoppage of coal supply *viâ* the railways, but the goods traffic by rail has been so largely stopped (other than food), and there will be much disorganization and such a considerable amount of arrears to be made up when full running starts again, that it will be some time before coal deliveries can be expected to be made with normal regularity. The winter, too, is now hurrying its pace towards us. Maximum use must therefore be made of what coal is in hand. So the Coal Controller wired *carte blanche* to gas engineers and managers as to stretching the make of gas to the very utmost—thus abandoning the limit of 425 B.Th.U. Fresh instructions (as will also be seen from the telegram on a later page) were included as to the reduction of pressures, according to the position of coal stocks. This may not be altogether pleasant to the consumers; but the community generally have been taking the whole strike very philosophically—recognizing that this is their fight against the tyrannous use of the power of a leading trade union, and so an additional hardship to them is merely part of the inconvenience that has to be suffered by participation in warfare. Gas undertakings should generally—as the Gas Light and Coke Company have done—remind the public to readjust their air regulators to suit the lower calorific power gas. However, the Coal Controller is anxious to be kept in close touch with the coal stocks at all gas-works. Early every Tuesday and Friday mornings (we are not at the time of writing anticipating there will be many on which the necessity for doing this will arise), he wants to know by telegram the condition of the stocks at the end of the previous day. By the way, "It's an ill wind that blows no one any good." Gas-works receiving coal by water are not at the moment grumbling. If more colliers were now available, some gas-works more accessible from the coalfields might even have the sensational experience of "declining with thanks" offers of further deliveries. [Since this article was written, there has been the railway settlement; and as we are going to press, a message from the Coal Controller's office informs us that there may be a radical alteration of the instructions this week.]

Points to be Noted in Gas Legislation.

In this issue of the "Journal," a beginning is made with the review of the Gas Acts passed during the year, with a view to chronicling the changes that have been effected during the progress of the measures through Parliament. One thing that strikes the reviewer is the curtailing of the capital powers for which gas companies ask. This is sometimes done by agreement, to avoid a parliamentary fight; and sometimes Committees, in their non-technical wisdom, solemnly declare that they think a case has been made out for some reduction, and an amount is arbitrarily chopped off. Promoters must not be too willing nowadays to make concessions in this respect, unless the amount asked for has been based on very generous estimates. At any rate, opponents and Committees should remember that the estimates of capital requirements must be founded not on the costs for materials and labour ruling before the war, but on those that prevail to-day. From this point of view alone, capital requirements will, on an average, exceed 100 p.ct. more than they did before the war, assuming that there were no other considerations. But there are. These are days when maximum economy must be assured, by securing the best possible production per man and per ton of coal. The plant needed for this purpose (together with the auxiliaries which tend to cheapen production) is of a structural character that costs more than the older types of plant; but the economy of it pays. When a good return of economy is provided, capital expenditure is something that should be encouraged, and not obstructed. In such obstruction, there is no public advantage, but the contrary. Then, if the gas industry is to develop its services to the public, and supply on a still larger scale gas for fuel purposes which will reduce labour in the household and factory, promote efficiency, reduce the smoke trouble, and convey the fuel by subterranean means instead of by surface carriage which helps to increase the wear and tear upon the roads, this all means increased expenditure. But it is expenditure that is of advantage to the whole community.

Therefore gas companies should in going to Parliament be liberal in their capital estimates; and local authorities should not set about trying to effect the cutting-down of proposed capital powers without they are well assured there is full justification in what they propose. A case in point as to the folly of local authorities stripping capital authorization of all margin—especially in these times—is supplied by Norwich. The facts were given in the address to the proprietors of the British Gas Light Company by Mr. R. S. Gardiner, as reported in the "Journal" last week. The Company, when last in Parliament, asked for £400,000 additional capital powers for Norwich. The Corporation, however, pressed the Directors to reduce it to one-half; and it was stipulated that only £120,000 of this should be expended at the Palace works. The estimates were worked-out during the war; but before wages and materials had ascended to present levels. When tenders are invited for only the plant wanted for (be it marked) immediate requirements, the price is £150,000 or £30,000 more than was stipulated by the Council as the total expenditure. It is futile for local authorities to deal lightly with such a serious business as the capital expenditure on a public service. They must measure the position not by the conditions existing before the war, but by those that are present; and these should not be cut too finely. We see that the Bournemouth Company had their application for additional capital powers (£600,000) cut down to £450,000—a 25 p.ct. reduction; and there were other applicants this year who also had to drop their estimates to a lower sum. The absurdity of this fancy for diminishing capital proposals is further strongly emphasized when one considers the safeguard there is in the (for gas) higher rates of dividend and interest that will have to be paid for capital, as well as the expensiveness of the

materials, goods, and work generally on which capital has to be spent. Gas directors are not expending a sovereign now that is avoidable, having regard to the safe conduct of the business, or that will not produce a return in economy. Therefore, one cannot understand the affectionate attention of local authorities to the amount of capital authorization. Authorization does not mean expenditure. And talking of higher rates of dividend and interest, Parliament, in the Acts of to-day, are allowing the directors of some gas companies to fix what dividend they think fit upon the preference and debenture stocks (redeemable and otherwise); and, in connection with preference issues, one frequently comes across "not exceeding 7 p.ct." Think what this means as a deterrent to a gas company expending more capital than is absolutely essential, unless it is productive of a higher economy. A notable point in the South Shields Gas Bill is that the Company have been allowed to increase their borrowing powers to one-half of the issued and paid-up capital.

The Private Bill authorities and the Select Committees are to be pitied. They are so bound up with precedent, and have such a petrified belief that they have no judicial powers, or right to exercise thought for themselves, that they will not depart one iota from prior decision. The Government calls for coal conservation, and the Board of Fuel Research has assured Parliament that the fixing of one definite standard for gas supply all over the country is a serious economic mistake. But this does not matter. Knowing that they can realize more advantage from a ton of coal with a lower calorific power standard, the Huddersfield Corporation asked for a 450 B.Th.U. standard; they were told that 500 B.Th.U. is the limit. The South Shields Gas Company believed on excellent grounds that they could do better with a 475 B.Th.U. standard. Those who deal with Private Bills cannot help that—500 B.Th.U. is the precedent they know. They have no concern with progress and economy; and so 500 B.Th.U. is in their minds the correct thing. The Stocksbridge Gas Company are going to supply coke-oven gas; and they showed cause for a 400 B.Th.U. standard. "Very well," say the wiseacres, "so be it. But if you manufacture coal gas yourselves, it "must be of 500 B.Th.U." They know nothing of the fact that, if consumers' appliances (not only lighting burners) are adjusted for 400 B.Th.U. gas, they will all have to be readjusted for a 500 B.Th.U. gas. When investigation has revealed so much, it is playing at legislation to ignore the lessons. Legislation should keep pace with scientific knowledge, and not loiter behind it. For it to do so does not display acumen or ability on the part of those responsible; it is to say the least a crude method of procedure. We see, too, that, though economical production of everything is necessary for the country, the same Private Bill authorities are continuing to impose the one-third purchase restriction upon gas undertakings in connection with their secondary products. More farcical proceedings in a country that is talking of reconstruction, and of making the most out of its resources by utilizing economical means, it would be difficult to find.

Two more general matters. The rule regarding minimum pressures appears now to be 15-10ths. In various Acts, certain railway companies have obtained 20-10ths; and 20-10ths is the minimum pressure that has been inserted in the Bournemouth Gas Company's Act. A sign of the increased costs of the times comes in the Acts for this session. The old form of prepayment clause, with the 10d. for meter and fittings, and 1s. for meter, fittings, and cooker, has been assailed. The Pembroke District Gas Company have secured the alteration of the figures to respectively 1s. 3d. and 1s. 6d. Other concerns have adopted the old 10d. and 1s., with the alternative of 10 p.ct. per annum on the cost of the meter, fittings, and cooker, whichever amount is the higher. Costs must be covered, and a fair return secured for capital, or there would be little use doing business.

"Volume or Value."

It can only be supposed that a paragraph that has appeared, under the above heading, in the South Metropolitan Gas Company's "Co-Partnership Journal" was written by someone who is not fully alive to certain facts; for, taking full measure of recent controversy, there is in it an evasion of the whole truth, which we do not for a moment believe anyone connected with the Company who is completely cognizant of the matter would have wittingly or deliberately indulged in. It states that the intention of the Company to accept without reservation the conclusions of the Fuel Research Board on gas standards, and as a logical consequence to apply to Parliament for powers to charge for gas according to its heat value, has been vigorously criticized by eminent representatives of gas undertakings who supply a larger bulk of gas per thermal unit than the Company have been in the habit of delivering to their consumers, and who naturally wish to be paid for the bulk rather than for the heat contained in it. This is unkind, and, looking at the discussion as a whole that has taken place, a misrepresentation. There are very few gas men who have vigorously opposed the proposal to charge for gas on the heat unit basis, or have any particular wish to continue to be paid for the bulk of gas rather than for the heat contained in it. There are very few gas men, too, who have any care whether, under the Beilby report, the South Metropolitan Company supply thermal value in concentrated form or in a manner which would enable more thermal value to be obtained per ton of coal used, though the volume of gas may be larger. At the same time, there are many men who doubt the wisdom of supplying gas in a thermally highly concentrated state, seeing that it limits the extraction from coal of the largest number of B.Th.U. in gaseous form, and that, after all, when the gas-air mixture reaches the point of combustion, there is only available per volume of mixture approximately the same thermal value as with gas of lower calorific value. The lower power gas, however, is more susceptible to thorough admixture with air; and this is an advantage. The major part of the men of the industry are quite willing to charge on heat value if thereby they can get greater liberty in gas manufacture; and so it is not right to suggest that these men prefer to be paid for bulk of gas rather than for the heat value contained in it.

The actual "vigorous criticism" that has been made has been against the creation of statutory precedents in relation to super-refinements in gas supply, and not against the question as to doing business on heat value. And it has come as a great surprise to many that the South Metropolitan Company, who have always stood for freedom, should have indicated a willingness to take part in creating (when no real need has been proved for doing so) further precedents which might prove very irksome indeed to gas undertakings the conditions of which vary—in some cases, enormously—from their own. Wittingly or unwittingly, the paragraph obfuscates the true position. What is being done by the South Metropolitan Company is pictured as a "reform" and Dr. Carpenter as a "pioneer;" but, "like all pioneers, "he will have great opposition to encounter, and may not "get much help from the Technical Press, which cannot be "reasonably expected to disregard the fact that most gas "companies (*i.e.*, most of its subscribers) would in this "matter rather go on in the old pre-war paths." Has it come to this that the loyal defenders of South Metropolitan policy must season their arguments with sneers? Our own position is known to us better than to the South Metropolitan Company; and we are completely confident, and equally that this is the judgment of disinterested observers, that we do not allow subscriptions or even friendships to affect our independence. The South Metropolitan Company are surely aware of this. If not, it is time they were. However, when a critic has to take the lines that protrude so sharply from the paragraph in the "Co-Partnership "Journal," it is pretty good testimony that he rather feels that his own attitude has not within it the strength he could wish. Who is the nettled one?

Meetings and Papers.

The Midland and North of England District Associations meetings have been indefinitely postponed, owing to traffic disorganization. Although the meeting of the Eastern Counties Gas Managers' Association was not held last Wednesday, through the inadequacy of travelling facilities, we learned upon inquiry of the Hon. Secretary (Mr. F. M. Paternoster) that the papers that had been prepared for the meeting might at once be published. This is done to-day; and it will be rather helpful than otherwise to a good discussion, whenever the next meeting is held.

The Breaking Point.

The coal miners were not heard of to any extent in connection with the railway strike. Much as the spirit is willing to

help their friends, they have their own little difference to settle with the Government over the matter of nationalization; and they may be reserving their resources for this purpose. Meantime, many miners are, while waiting for railway trucks to enable them to resume their work of production, able to meditate over the great hazard there is in strikes of the kind. Men to the number of about 9000 in the shale mines and oil-works of Midlothian and West Lothian will also possibly have an early opportunity of deciding on the value to them of the first Sankey report; for there is a prospect that through it, and the award of 2s. a day extra wages, with the 6s. per ton on the price of coal, and other burdens, the Scotch oil industry will completely collapse. The 2s. extra pay per day means to Scottish Oils, Ltd., over £250,000 per annum; and the 6s. on the price of coal a further working charge of £213,000 per annum—the result being that the industry is now being worked at a loss of £190,000 per annum. The men are now insisting upon the reduction of the working hours from eight to seven. This demand, if persevered with, will sweep the industry right away into a position in which it would be sheer insanity to go on; and there would be no alternative to closing-down. Economic limits do not fall within the range of view of the wage raisers and the hour reducers. Evidently, in their opinion, such limits can only be found out by absolute disaster. The shale oil workers stand a very good chance of ascertaining something very definite as to the limits that apply to their own circumstances.

Gas and Ventilation.

In later columns, there appears an abstract of a report on the question of gas and ventilation in school rooms prepared by Mr. E. T. Swinson, one of the London County Council Inspectors; and it is based on experiments he has carried out. One cannot very well criticize the report, because the abstract is (we believe) little more than a skeleton of the original, and we do not know what further information this contains. But judging from the digest, Mr. Swinson has succeeded in proving what anybody could have told him would happen, that the use of gas for lighting in any room would raise the temperature more than the use of electricity, all other conditions being equal. But such an increase of temperature is not in the winter time at all a bad thing, especially where children are sitting at their studies, and bodily inactive. The summary does not tell us anything as to the structural conditions of the rooms, their cubical capacity, their heights and superficial areas, or whether the ventilation, arranged and indirect, would have a parity as between room and room. Were the number of occupants the same? Were the number of lights the same? Was their candle power the same? If there was not equality of conditions in every respect, then any comparison of the curves as grouped is vitiated. Further, there are no means on the face of what is presented in this summary of judging how much of the rise of temperature is due to the continuous presence of people; to continuous heating in the winter time; and due to gas lighting. We do not even know whether the ventilation provided was sufficient under the various conditions of the rooms; nor at what positions in the height, or in relation to the heating arrangements and the burners, the temperature readings were taken. It may be wholly the fault of the summary; but if we were asked to judge on what is here presented and nothing more, we should have to say that the experiments were of an entirely crude nature, and do not prove anything of material importance. We should much prefer an investigation by one accustomed to the examination of the chemical conditions of the atmosphere and all the structural, ventilating, and other causes contributing to change in the state of the atmosphere. A report presented with detailed thoroughness in respect of essential data would enable one to put the figures under critical survey. But it is no use making an attempt of the kind on the information before us.

Continuous Tar Distillation.

This form of tar distillation plant is receiving increased attention and favour. Though it was the first of Hird's continuous type of plant that was built at Talk o' th' Hill Colliery, Mr. S. Stonier, in a paper recently read before the Western Section of the Coke-Oven Managers' Association, speaks very highly of it; and yet there have been considerable improvements effected in the plant as now constructed. The testimony therefore, shows that the first principles were quite sound. There is a preference for gas-firing the plant; but the use of breeze is very successful. There is considerable economy of fuel; and the control is not more exacting than that required by a steam-boiler. Mr. Stonier, the paper testifies, is devoted to the system; but the pot still type has not yet lost its adherents. The type chosen will much depend on the work to be done.

The Coal Output.

We shall expect to see a continuation of good figures for coal output up to at any rate Sept. 27, and then through an absence of railway transport a collapse must be looked for. In the week ending Sept. 20, the production was 4,450,308 tons—a drop of about 39,000 tons on the preceding week, chiefly due to lessened output in Durham. The figures show that the bad weeks in July and early August were capable of rapid improvement, if only the miners put their backs into the work, notwithstanding the reduction of the day from eight to seven hours. Owing to the coal strike, licences for the export of coal, coke, and manufactured fuel were stopped last week.

TEMPORARY INCREASE OF CHARGES ACT.

Further Orders Made.

The following further Orders have been made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act, authorizing increases in maximum charges to the extents named.

Barry Urban District Council, from 4s. 6d. to 5s. 3d. per 1000 c.ft.
Chorley Corporation, from 4s. within the borough and 4s. 6d. beyond, to 5s. within the borough and 5s. 6d. beyond.
Drogheda Corporation (by the Local Government Board for Ireland), to 7s.
Ellesmere Urban District Council, from 5s. 6d. to 6s.
Glastonbury Corporation, from 5s. 6d. to 6s. 6d.
Hindley Urban District Council, from 5s. to 6s. 6d.
Leeds Corporation from 4s. 2d. to 5s.
Rotherham Corporation, from 3s. 3d. to 4s. 9d.
Rothwell (Northants) Urban District Council, from 5s. 6d. to 6s. 9d.
Sidmouth Urban District Council, from 5s. 6d. to 7s.
Silsden Urban District Council, from 4s. 6d. to 5s. 6d.
Warrington Corporation, from 4s. within the borough to 5s.
West Bromwich Corporation, from 4s. to 5s.

INSTRUCTIONS TO FURTHER STRETCH GAS.

Early last week, the Coal Controller dispatched a telegram—we take it to all gas undertakings—giving further instructions regarding the make and pressure of gas, in view of the stoppage of coal supplies due to the railway strike. The telegram was as follows:

> Referring to Gas and Coal Emergency Order, dated Sept. 26, 1919, as no further coal supplies can in general be delivered during the strike and for some time afterwards, the following instructions with a view to maintaining essential services are to be observed until further notice.
>
> Make of gas per ton of coal should immediately be stretched to the utmost.
>
> If the stock of coal is reduced below what will maintain a supply of gas of reduced quality for three weeks, it will be the duty of every undertaking to reduce the pressure of gas supplied so as to prevent consumers using gas during a certain number of hours—say, eight in each twenty-four—and to increase the period of reduced pressure as necessity arises.
>
> If stock reduced below two weeks' consumption, supply to industrial consumers, other than manufacturers of food, to be cut off.
>
> Telegraph first thing every Tuesday and Friday morning stock at end of previous day.

[It is understood that a radical alteration of these instructions will be issued this week, in view of the railway settlement.]

The opening meeting of the new session of the Scottish Junior Gas Association (Eastern District) will be held in the Heriot-Watt College, Edinburgh, on Saturday afternoon next, when Mr. Robert MacLaurin, of Stirling, will read a paper on "Low-Temperature Carbonization." Mr. L. Farquhar, of Alloa, will also deliver his Presidential Address. A copy has been received from the Hon. Secretary (Mr. R. L. Laing) of the Association's "Transactions" for the session 1918-19, which have been reprinted from the "Journal" reports of the meetings.

PERSONAL.

Our local correspondent writes that Mr. J. W. M'Lusky, the Blackburn Corporation Gas Engineer, is one of three candidates in the final running for the post of Gas Engineer at Glasgow, the salary of which is £1500 per annum. He adds that since Mr. M'Lusky went to Blackburn he has shown marked ability; and his plans for the future development of the gas undertaking there are believed to have greatly impressed a deputation from Glasgow, which included some of the ablest men in the gas profession and business life of the city.

Mr. Hedley Hoy, the Engineer and Works Manager of the Cannock, Hednesford, and District Gas Company, Ltd., has been appointed Gas Engineer and Manager to the Workington Corporation. Mr. Hoy, who has been at Cannock since 1916, was for four years with Mr. George Lane at Aylesbury, as pupil and assistant. Then, after nearly two years with Messrs. Graham, Morton, & Co., of Leeds, as engineering draughtsman, he was for eight years Assistant Gas Engineer at Lancaster. Before going to Cannock, he was for more than three years Engineer and Manager of the Tyldesley Urban District Council gas and water undertakings.

The Johannesburg Municipal Council report the resignation of Mr. J. H. Dobson, the General Manager of the Gas and Electric Supply Department. In view of the excellent services rendered by Mr. Dobson during the last eleven years, and of the fact that he has willingly undertaken additional duties and responsibilities outside the terms of his original appointment, for which he has not received any additional remuneration, the Council considered that he should have some tangible token of recognition of these services. They therefore decided to give him a bonus of £1000. Steps are being taken to fill the position, at a commencing salary of £1250.

The Blackburn Town Council have confirmed the appointment of Mr. E. L. Nicholas, of Cardiff, as Assistant Gas Engineer, for the borough, in succession to Major J. C. Wynne, whose resignation was intimated last week.

PRESENTATION TO MR. R. G. CLARRY.

At the Swansea Gas-Works, last Friday week, before a very large and representative gathering of the staff and employees, Mr. R. G. Clarry, the Engineer, Manager, and Secretary, was presented with an inscribed solid gold cigarette case, and an illuminated enlarged group photograph of the Company's employees, as tokens of esteem, and in recognition and appreciation of his services, on the occasion of his resigning his position under the Company to take up the appointment of Managing-Director to the Dyffryn Steel and Tinplate Works.

The presentation was made by Mr. G. Dean (the General Foreman), who said that during the eleven years Mr. Clarry had been with the Company—for the last six years as Engineer, Manager, and Secretary—he had always shown them a deep sense of duty and discipline, and had won their sincere respect by his efficient administration. The Company and the employees were exceedingly fortunate in having had Mr. Clarry as their Engineer and Manager. He trusted the good feeling that now existed would follow him in his new sphere, and that his venture would prove highly successful; and also that he and Mrs. Clarry would enjoy long life and happiness.

Mr. E. Ablett (the Secretary and Assistant Engineer), endorsing the remarks of Mr. Dean, stated that Mr. Clarry, in his management, had been eminently successful. The esteem in which he was held by the workpeople was evidenced by the beautiful presents he was asked to accept, which had been subscribed for entirely voluntarily. Mr. F. G. Andrews (the Assistant Manager) referred to his close association with Mr. Clarry during the past eleven years, and said that, in losing him, the Company sustained a great loss, as also did the gas industry.

Mr. Clarry, in a feeling response, said that the occasion was regarded by him as an outstanding phase in his life. He could not recollect an unpleasant incident during the whole of the time he had been with the Company. The employees from the outset had given him every encouragement. He had always trusted the men; and he felt convinced that many strikes and labour troubles would be averted if there was a similar understanding between other employers and employed. In regard to his new appointment, it was entirely unsought. The offer came as a surprise; and it was only after anxious thought that he decided to make the change from a position where he was well thought of and appreciated—particularly as the Directors of the Company had always treated him generously. Referring to the presents, he stated that he valued highest of all that which was not obtainable by money or authority—esteem, respect, and goodwill. The cigarette case would satisfy a long-standing desire; the photograph would serve to recall the faces of many old friends in Swansea.

Miss P. Hughes (one of the Company's clerical staff) presented Mrs. Clarry with a beautiful bouquet.

GAS ACTS FOR 1919.

[First Article.]

In reviewing the Gas Acts for the past session, we shall, as far as possible, confine ourselves to noting only the changes that have taken place during the progress of the Bills, which were summarized in the issues of the "Journal" for Jan. 7, 14, and 21, and (two late measures) in that for April 22.

The proceedings under the Ammanford Gas Bill have not yet been completed.

The Bedwellty Urban District Council Act is, in effect, one for reorganizing the gas and electric supply of the area. This late promotion did not receive attention in our original review. It may therefore be explained that the Rhymney Valley and General Electric Power Supply Company, Ltd., supply current in the district of the promoters, and in a portion of the urban area of Gelligaer, and is authorized to supply in Mynyddislwyn. By an agreement entered into with the Company by the Bedwellty Council and the District Councils of Gelligaer and Mynyddislwyn, they arranged to purchase the property for £9000. The gas supply is in the hands of the Bedwellty Council. In their Act of 1912, it was provided that, if the Mynyddislwyn Council promoted a Bill, they could purchase the part of the undertaking in their area; and until they erected gas-works of their own, the Bedwellty Council should supply them with gas in bulk at 3s. per 1000 c.ft. They promoted a Bill the following year, obtained the necessary powers, purchased the part of the undertaking in their area, but have not constructed works of their own, and so still take a supply of gas in bulk. The Bedwellty Council now asked that the price of gas to the Mynyddislwyn Council should be varied, owing to the increased charges for labour and materials, which had raised the cost to 4s. or thereabouts. The clauses of the Act empower the carrying-out of the agreement for the purchase of the electricity undertaking, and provide for the transfer to the other two Councils of the portions in which they are concerned. There are the necessary provisions for duly carrying-on the electricity undertaking, among which we notice one which is worth quoting in this column:

> The Council shall, on the expiration of the fifth complete financial year after they have commenced to supply electrical energy under this Act, and on the expiration of each third succeeding year, reconsider, and if necessary revise, and thereafter maintain, the scales of prices charged for electrical energy under this Act so that, so far as is reasonably practicable, no rate will be required for the purpose of defraying the future expenses of the said undertaking during the next three years: Provided nevertheless that:
>
> (*a*) The prices to be charged shall not exceed the maximum prices which may be charged under this Act.
>
> (*b*) The scale of prices so reconsidered and revised may be from time to time in like manner reconsidered and revised by the Council.
>
> Nothing in this section contained shall prevent the Council from entering into contracts for periods which may extend beyond the periods at which any revision may take place under the provisions of this section on special terms under special circumstances not applicable to ordinary consumers, but each such contract shall provide that the price to be charged for energy supplied under such contract shall either:
>
> (*a*) Be subject to revision at the next triennial revision provided for in this section; or
>
> (*b*) Vary in the same proportion as the prices charged to ordinary consumers.
>
> Provided that the Council shall not without their consent be required to accept any price lower than the minimum price mentioned in such contract.
>
> There shall not be made against the district rate or any other rate for energy used by the Council for street lighting or any other purpose a charge at a higher price than that charged to consumers using energy for similar purposes and for the like hours of supply.

The Act empowers the purchase and supply of coke-oven gas. It prescribes a calorific power of 500 B.Th.U.; and a pressure of not less than 15-10ths. The price to be paid for gas by the Mynyddislwyn Council is to be the average cost to the Council of all gas made or bought by them, which price, failing agreement, is to be determined by arbitration. At the expiration of five years from the passing of the Act, the Bedwellty Council or the Mynyddislwyn Council may give six months' notice to determine the agreement. Power is given to borrow the money requisite for the purchase of the Bedwellty portion of the electrical undertaking, and £4233 for repaying the balance due at the passing of the Act on the gas capital account. Authorization is also given to the Gelligaer Council to borrow the money they require under the Act. [*Parliamentary Agents: Messrs. Baker & Sons.*]

The Bournemouth Gas and Water Company have secured the powers they require for the construction of a cableway and mains; but protective clauses have been inserted in favour of Poole Corporation. New compulsory land powers and easements are conferred, expiring, if not put to use, at the end of three years from the passing of the Act. The proposals of the Company regarding the purchase of lands by agreement, the provision of dwelling-houses for employees, participation in town-planning schemes, and the works powers sought, are confirmed. The conversion of the 5000 original shares of £10 each into 10,000 shares of £10 each, bearing a standard rate of dividend of 5 p.ct., has been

allowed. The additional capital sought has, however, been reduced from £600,000 to £450,000. The other clauses noticed in our former review do not appear to have changed in any respect. The minimum pressure of gas has been raised from 15-10ths to 20-10ths. [*Parliamentary Agents: Messrs. Dyson & Co.*]

The Brentford Gas Company have obtained power to purchase 20 acres of land for the purposes of their undertaking, and additional works powers are allowed. A clause gives the Board of Trade power to relieve the Company, for twelve months from the termination of the war, of any obligation to supply any consumer with an increased quantity of gas, or to give a new supply. The Company are empowered to raise additional capital to an amount sufficient, with the £335,974 which they were empowered to create by the Act of 1914, to produce £800,000. The limit on the dividend on preference stock imposed by section 23 of the Act of 1914 is removed; and the Directors are authorized to fix the limit at the time of the issue of the stock. The Directors are also given power to raise £400,000 on mortgage or by debenture stock—the powers to borrow here conferred being substituted for those granted by previous Acts. Sanction is also accorded to the raising as redeemable the preference stock authorized by the Act of 1914 or any debenture stock for which powers were given in the 1914 Act or the present one. [*Parliamentary Agent: Mr. John Kennedy.*]

The power to borrow £59,824 asked for by the Dover Gas Company has been granted, as well as the right to issue redeemable preference and debenture stock. The Company sought authority to redeem, if they think fit, at any time during a period of ten years from the passing of the Act, the sum of £10,000 of any such stock created and issued for the purpose of defraying abnormal reparation expenditure due to circumstances arising out of the war—such redemption to be effected either by way of the payment off of annual instalments, or by way of a sinking fund calculated to pay off the same at the expiration of the period. The amount named has been reduced to £6000. There are no other changes from the notice which we gave the Bill on April 22—this being a late promotion. [*Parliamentary Agents: Messrs. R. W. Cooper & Sons.*]

The Hartlepool Gas and Water Act deals largely with the water-works; but there are, as the notice of the Bill on Jan. 7 shows, a few clauses relating to the gas undertaking. We see the Company have had the one-third residuals purchasing restriction imposed upon them. Most of the other clauses are common in present-day gas legislation. Power is given to the Company to purchase gas from other sources, and for the sale of gas in bulk. The financial powers sought have not undergone any change. [*Parliamentary Agents: Messrs. Wyatt & Co.*]

The Huddersfield Corporation Gas Act carries out the purchase of the Longwood and Kirkheaton Gas Companies' undertakings and businesses on the conditions which were fully described on Jan. 7. The limits of the additional area of supply are defined. The calorific power of 450 B.Th.U. sought has been declined; and the old 500 B.Th.U. has been imposed. A big batch of ordinary and protective clauses appear. Power is given to raise the requisite sum for the transfer of the two gas undertakings; but the period for repayment has been reduced from 40 to 35 years. The proposal to have power to borrow £100,000 for the construction of works, the laying of mains, and the general purposes of the undertaking, also repayable in forty years, has been deleted; but the Corporation may, with the consent of the Local Government Board, borrow such further money as may be necessary for any of the purposes of the Act, or of the gas undertaking of the Corporation. No other alterations from our previous notice are observed. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The Newark Gas Company's Act is practically a reproduction of their Bill, noticed in the "Journal" for Jan. 7. The land, works, power gas, and calorific power standard are all the same; and the ordinary pressure is to be 15-10ths as proposed. But it is provided that:

> From and after the installation by the Great Northern Railway Company or the Midland Railway Company, as the case may be, of a system of inverted burners on their premises in the limits of supply, and so long as such burners shall remain in use, all gas supplied by the Company to the Great Northern Railway Company or the Midland Railway Company, as the case may be, shall be supplied at such pressure as to balance a column of water not less than 20-10ths of an inch in height at the inlet of the primary meter or meters registering the supply to such Companies respectively.

The clause asking for authority to apply for a Provisional Order to confer electrical powers has disappeared. The additional capital of £50,000 is granted, together with the financial provisions asked for. The other clauses are as in the Bill, which, however, has been considerably extended in bulk by protective provisions. [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

The Northampton Gas Company have secured the extension of their limits of supply, and further lands and works powers, appended to which is the one-third restriction as to residuals purchase. The authority sought to raise £130,000 additional capital is conceded, together with power to borrow £70,000, provided that the amount of borrowed capital does not exceed one-third of the capital raised. Authorized preference and debenture stock may be issued as redeemable. There are no other changes worth special mention. [*Parliamentary Agents: Messrs. Vizard, Oldham, Crowder, and Cash.*]

ELECTRICITY SUPPLY MEMORANDA.

Naturally all undertakings—be they gas or electricity—want to get as many consumers as possible because of their prospective rather than present value to the concern. But there has to be discretion. If the plant has the maximum load it can carry, it would be sheer madness to take on new custom, and jeopardise the old, because it would have the one consequence of raising discontent among the old consumers, and creating dissatisfaction among the new. The "Electrician" has an editorial note on this subject, written no doubt in great earnestness, but not, in our opinion, with sufficient balance of thought. The writer says it is a common complaint of many electrical engineers that they have more orders than plant, and consequently cannot undertake to accept more consumers, or even to emphasize the advantages of electricity by suitable publicity. That it is the "common" complaint of "many" engineers shows that "many" brains have been at work, and their decision is unanimous. However, our contemporary thinks the attitude of the "many" is a mistaken one. The reason advanced for this belief is that the services of electricity during the war have been very much emphasized, and the average member of the public is now well aware of the advantages to be gained through electricity supply. Then wherein is the good of the Electrical Development Association? However, if such an impression has been made, are the advantages of electricity likely to rapidly fade from the mind of the average member of the public? If so, the advantages have not become very deep-rooted. And who is that "average member" of the public? Is it the man who ran a munitions factory, and to whom cost was a small thing with a generous Munitions Department looking after his recompense? Or is the "average member" the person who was put in charge of a catering kitchen, where it was found that, while electricity was possible for use inside an oven, speed and economy voted for other branches of culinary operations being performed by other agents? We do not know exactly what was in the mind of the "Electrician" writer; but the ordinary member of the public had little opportunity of being impressed. Certainly, the "average" member of the public sees little advantage, at current prices, in utilizing electricity for many operations; and those who are induced to do so would soon sicken of the cost and (say, for heating and cooking) the disadvantages, and eternal enemies and bad advertisers would be made. Seeing the frame of mind which the writer in the "Electrician" imagines exists in the average member of the public, he says it is obvious the station engineer should "obtain as many consumers as possible, so long as he does not overload his plant." This is precisely the attitude that the station engineer is taking, but against which the protest is made.

Public Impressed by Electricity's Advantages.

Now for the course the station engineer is advised to pursue by his counsellor. It is admitted that the station engineer has before him the most difficult time of the year. True; and a time that will in all probability be beset with difficulties of graver character than have yet been experienced. Our contemporary urges that it should be possible to connect a certain number of consumers on condition that they take a supply of a limited character, which might be based on correspondingly favourable financial conditions. "Even in highly industrial districts, having a good flat load-curve, there is usually a small ultimate peak which must be borne during four or five nights of the week for perhaps an hour or so between the months of October to January. Waiting consumers might often be glad to take a supply on condition that they should refrain from use during these hours, or at least keep within some fraction of their full load." There is extreme danger in putting fetters and conditions upon new consumers. If these do not fit his circumstances and requirements, he will soon try to break through them; and once he becomes a consumer, if the time of his use-prohibition happens to be one when he needs the current, he will ask himself why he is not just as much entitled to use it at that time as his neighbour. Such conditions do not make good friends; but they do, and that soon, generate dissatisfaction. However, the counsellor holds that the main thing is to tide-over the present position of plant shortage without restricting new business, or allowing the public to gain the impression that there is a deficiency of supply. So easily said. But the limited supply advocated is the very thing to create the impression that there is a deficiency. If a consumer is so deeply enamoured of electricity, and is told he must wait for it, it will make his desire all the keener, and the more permanent. But the electricity supplier must be careful not to let him know too soon the new costs of installation and appliances, nor say too much about the fresh order of running costs. Otherwise he will quickly frighten the would-be customer off his pitch.

A Dangerous Path.

Electricity charges, like those for other commodities, are moving up by leaps and bounds. The last list published in the "Electrical Times" quotes, among others, an increase of 20 p.ct. at Carlisle, making 70 p.ct. on pre-war charges, providing the statutory maximum is not exceeded.

The Flight of Charges.

Falmouth has raised its price from 6d. to 7d. per unit; and Godalming, 8d. to 10d. The flat-rate at Harrogate has been increased to 7½d. Short-power supplies are also to be charged 7½d.; power up to 10,000 units is to be charged at 3d. per unit; and large-power supplies, 1½d. per unit. The increase at Lowestoft is to be 10d. per unit for lighting; and heating and cooking, 2½d. per unit. Melton Mowbray has gone up from 8d. to 9d.; Woking is now at 9d.; while the charge at Walton is 10d. Sunderland has determined to apply the coal clause to general lighting. From this, and what has been said on a previous occasion, it will be seen that the charges of 9d. and 10d. per unit are becoming more and more favoured.

Beautiful Deception.

Yet the writer of "Gossip" in "Electrical Industries" considers there are very good reasons why the gas industry should concentrate upon the heating and cooking business, and let the lighting load take care of itself, "through the last stages of decay." He is suffering from a beautiful deception, which directs to the use of inflated language a mind that obviously passes by solid facts and sees only a mirage in which electric lighting rules. Readers can judge of this for themselves by a single extract from the latest piece of fantastical pen work: "People who have to put up with fittings that become clogged with soot and dirt, burners that belong to the order of ephemera, and globes that crack as a matter of course, are not likely to be comforted by the thought that every gas-flame, whether it roars, whistles, or pops, cremates many million microbes in the course of the evening." It is not worth while dealing with such stupid extravagance, when the output of gas during the hours of darkness exceeds that of the whole business of the gas industry before 1882, when wasteful flat-flame lighting was the fashion. The inverted gas-burner has now been so improved that the cost of its maintenance to-day is modest to the point of being negligible; its intrinsic brilliancy is not eye-harming; the quality of its light is the superior of electricity; its diffusion is good; and its economy is not the least part of its superiority over metallic filament lamps. If all were true as "Gossiper" would have his unobservant readers believe, gas lighting would have collapsed long since. The erratic one speaks of the electricity industry as having "conquered" the lighting field; nevertheless, there is sufficient wisdom left to advise that the cultivation of this field should not be neglected. It is admitted, too, that "in every community there are many people who do not use the electric light," and that there is plenty of scope yet for a domestic lighting campaign. This shows a more sober-minded state. The more the men of the electricity industry believe the lighting field has been "conquered" by them, despite costs and all else, the less will be their effort in that particular branch of business.

Comfort for the Eye.

Not a mere matter of whim or fancy, but of long observation and experience, is a well-established preference (where the comfort of the eye is studied) for lights relatively rich in yellow and orange rays. Incandescent mantles enable this preference to be gratified, without depreciating illuminating efficiency, much more readily than the metallic filament electric lamp. The "Electrician" calls attention to some experiments by Dr. Feree and Miss Rand, the results of which were recently summarized in the "Transactions of the American Illuminating Engineering Society;" and these support the preference for light rich in yellow rays. The experiments showed, says our contemporary, that the "efficiency of the eye" during a three-hour test diminished more rapidly with light from the metal filament lamp than when a kerosene oil lamp was used; the intensity of illumination being the same in both cases. More recent experiments on a series of incandescent mantles with graded uria content, and yielding light of progressively warmer tint, led to very similar result. But our contemporary wants to know more as to the method of defining the "efficiency of the eye." The method used by the author is based upon observation of the ratio of time during which type steadily observed appears respectively clear and blurred. Admittedly this is a rough-and-ready method; but it is an eminently practical one.

Conserving Heat in Electric-Ovens.

It is well known that cooking by electricity is not cheap. This is not the fault of electricians. It is due to the low thermal efficiency of their generating process; and there are other physical drawbacks to the securing of good temperatures for kitchen operations except at a prohibitive cost. Cost, time, and reliability are the factors that tell in competition; and quite 75 p.ct. of the heat required in kitchen and cooking operations is for purposes in which electricity is completely out of the running in competition with other agents. It is the oven upon which the electricians have based their hopes of really doing something. But even in this direction, the makers are still worrying their heads, and trying all sorts of plans, for conserving the heat generated. This cannot be done without adding to the cost of the oven itself; for it is generally in the direction of heavy lagging that they seek to imprison the heat that is generated. The "Electrical Times" speaks well of the "Purser" electric-oven—a product of Credenda Conduits Company, Ltd. It is stated that the chief aim of this oven has been to eliminate heat losses as much as possible. The walls are heavily lagged; and as the door must make a completely air-tight joint, strips of rubber are fitted round the edges. Heat and rubber are not good companions; and we can see the rubber having a somewhat short existence before perishing. Then it is seen that the principle of operation is that the current is switched fully-on; and the temperature is quickly raised to the desired cooking heat. The joint is then put in; and afterwards the current is switched-off—the meat being cooked by the heat that is "trapped" inside. It follows that, if there is no ventilation in the oven, the meat must be cooking in an atmosphere of steam. With all the padding, too, of the sides of the oven, and the rubber seal for the door, there must be leakage of heat through the various ways of loss—radiation, conduction, and convection. Therefore, the meat must be subject to a declining temperature; and with the supply of additional heat shut off, the power of heat penetration into the centre of a joint must be sensibly diminished. The heating elements consist of fire-clay bases, with the wires wound into grooves. We can see trouble in this direction with exposure to the steamy and greasy atmosphere of the oven. And these are called "improvements!" If electricity is such an economical agent in oven work, why go to all this exquisite trouble in trying to keep it within bounds?

Electrical Machinery Breakdowns.

"In probably no other type of machinery are the causes of breakdown so numerous as in electrical machinery." These are the words used by Dr. G. W. Worrall in beginning in the "Electrical Review" a couple of articles on the subject of breakdowns. It is most essential that great care should be taken to ascertain the conditions under which electrical machinery is to be used. It has a deeply-rooted objection to producer gas and chemical fumes; coal and iron dust and oil are not friends of the electric-motor; stresses due to electro-magnetic causes will seriously endanger the machine. Air filters should be fitted wherever there is the slightest risk of dust entering a turbo-generator. Fatigue of metal is a serious problem in the internal connections of an electrical machine. Bearings are a cause of serious trouble. Oil throwing is yet another difficulty. And so we go on wading through illustrations of troubles which comprise the two articles from the pen of the truthful doctor. Great continuous technical care is necessary to reduce troubles.

FUEL ECONOMY.*

THIS revised edition of Mr. Booth's little book comes appropriately when in industry and at scientific meetings so much is being said as to fuel economy. Though extending to 92 pages only, it covers much ground, and in a manner that will interest and help all steam raisers and users who are not getting top efficiency from their plants, and need guidance in a handy form. Judging from the efficiencies of boilers within personal knowledge and data as to efficiencies that are constantly reaching us, those in need of advice and guidance are in greater number than those who are not. Even central electric station engineers cannot claim by their work to be above the need of counsel from an expert, when we find variations between 2½ and 16 to 17 lbs. in the consumption of fuel per unit of electricity generated—not all of it due to the character of the coal nor of the load upon the station, as is proved by the wide differences in the efficiency of stations of comparable condition. With fuel at present prices, it is doubly important from the works' costs point of view that the most rigid economy should be exercised by the attainment of the highest efficiency; and this cannot be realized unless we know something about the principles underlying the methods of producing heat in boilers, and are cognizant of all the contributory appliances and factors to that end at its best. Heat has to be developed, and during the operations causes avoidable and unavoidable creep which brings about trouble and waste. The avoidable causes are those chiefly to look after, and, as far as possible, the unavoidable ones must be kept under control, so as to avoid any trespass by them into the avoidable region. About all these things Mr. Booth tells us, and in very succinct and intelligible fashion. The contents page contains about eighty subjects, beginning with "Calorimeters" and ending with "Essentials of Perfect Combustion" and "Water-Softening." The steam raiser and user who is not getting good efficiency from his plant, will find this book a useful key to better things.

* "Fuel Economy" (Second Edition, revised). By William H. Booth, F.G.S., M.Am.Soc.C.E., formerly of the Manchester Steam Users' Association. London: S. Rentell & Co., Ltd. Price 2s. 6d. net; postage 2d.

Bearing upon the development of the chemical industry in France, it has been stated that, from 1,000,000 tons a year before the war, the production of sulphuric acid has increased to 2,000,000 tons; while the manufacture of nitric acid, which was 15,000 tons annually previous to the war, had in 1918 reached 50,000 tons a month.

The seventh meeting of the Refractory Materials Section of the Ceramic Society, which, as intimated in the "JOURNAL" last week, was to have been held at Stoke-on-Trent to-morrow and Thursday, was, in view of the railway strike, postponed until the end of April next. This will cancel the spring meeting arranged for London. The autumn meeting of the Society in 1920 will be held in the United States.

CHEMISTRY AND SAMPLING OF COAL.

We have received the two first publications of the Lancashire and Cheshire Coal Research Association, which consist of a number of well-known colliery companies. The "bulletins" are issued at the nominal price of 1s., in order to prevent wastage, so far as possible; but they are well worth more than this small charge to students of the subjects with which they deal, as they give in a nutshell much useful, if in parts elementary, information. The Director of Researches to the Association is Captain F. S. Sinnatt, M.B.E., M.Sc. (Tech.), F.I.C., of the College of Technology, Manchester, so that one may rely on the information given in the pamphlets. The first of these consists of "Notes of Ten Introductory Lectures on Organic Chemistry, with Special Reference to Coal;" the second is on the "Sampling of Coal."

To students of gas, the chemical part of the first pamphlet will be valuable for the succinct character of the notes, and will serve well as an introduction to larger study. Others besides present-day students will, as we have done, find a perusal of the notes refreshing to the memory; for, when not in frequent use, some of the information before us is apt to slip from mind. There is a section in the same pamphlet dealing with coal analysis. Seeing that the pamphlet only occupies twenty-two pages, the part dealing with the carbonization of coal is a masterpiece of brevity; but the developments of the past three or four years have no place in it. From the chemical and economical standpoint, this is an omission; and perhaps we cannot do better than refer the author to Prof. Cobb's "William Young Lecture" to the North British Association of Gas Managers in 1918, and the report of the Gas Investigation Committee presented last June to the Institution of Gas Engineers.

With regard to the second pamphlet, on "The Sampling of Coal," we agree with the statement in the preface that the sampling of coal is the most vital feature in arriving at its true value; and unless merchants, consumers, and the collieries agree on a standard method, it is useless to attempt to buy and sell coal on the basis of calorific value and chemical analysis. "It is hoped that the matter contained in this bulletin may assist in the evolution of a standard method of sampling coal to replace the present haphazard methods." It is clear that Captain Sinnatt is not in favour of midget samples of coal as being a fair index to general quality, nor is he in favour of indiscriminate "sampling." He illustrates the mistakes that can be made. Take one illustration. An engineer responsible for a boiler installation was invited to submit for analysis a sample of the coal he was using. Permission was then obtained to take a representative sample of the same coal. The following results were obtained: Ash present in engineer's sample, 5 p.ct.; ash present in representative sample, 15 p.ct. The pamphlet covers a considerable area of information; but the importance that Captain Sinnatt places upon proper sampling and sufficient weight will be seen from these quotations:

As a rule it is considered that the gross sample should be from 1-40th to 1-80th of the total weight of coal. This rule is quite satisfactory so long as the gross sample does not exceed about 1000 lbs. When it does exceed this amount, the inaccuracies introduced during crushing, mixing, and the quartering of the sample become excessive.

Difficulty will be experienced in determining the most suitable weight for the gross sample. But it should be assumed that the smallest weight is 1000 lbs. for bulks weighing about 100 tons—*i.e.*, about 1 part in 200. The weight of the sample should not be reduced much below 250 lbs. for a truck of coal; for, assuming that a shovelful of coal weighs 15 lbs., this means that only 16 units are collected from 10 tons of coal. Either the sampling shovel should be reduced in size or a larger gross sample should be collected. If dealing with lumps, the former is not sound; hence a larger sample is desirable. If a number of trucks of coal from the same source have to be sampled, the weight of the sample—say 1000 lbs.—is determined upon, and the necessary fraction is taken from each truck. A separate gross sample should be collected for each distinct change in the type or source of the coal. Further, it is more accurate to take a number of gross samples and deal with them separately, than one sample, and have the sampling proportion very high. A sample of about 1000 lbs. in weight is large enough for most practical purposes; but larger weights can be handled with ease if a mechanical sampler or a small coal-crusher is available.

In obtaining the gross sample, great care must be exercised to ensure the presence in it of the proper proportion of large and small coal, and of large and small impurities. This may be checked approximately by carrying out a test (before the sample has been crushed) to determine what proportion of the sample will pass through (say) a sieve of ¼-in. mesh. This test indicates the proportion of a small coal present in the consignment; it also forms one of the simplest checks on any further deliveries. If the percentage of fine coal differs widely from that present in the original sample, then variation in the quality may be expected.

The Allied Gas Congress in France.

At the Allied Gas Congress to be held in France on the 16th, 17th, and 18th inst., M. Rouland, who was President of the Société Technique du Gaz en France last session, has agreed to take the chair. He was invited to do so, as representing the principal gas undertaking in France. The programme for the visit will be found in the "Journal" for Aug. 26, p. 439. The "Journal des Usines à Gaz" of Sept. 20 had learned of from sixty to seventy visitors from abroad who are practically certain to attend, and the presence of at least an equal number of French gas men is counted on.

GAS AND VENTILATION IN SCHOOLS.

In his annual report, the London County Council County Medical Officer of Health gives the following report on ventilation, occupation, and illumination in relation to the hygienic conditions of class-rooms.

Arising out of complaints of "dry throat" and other unsatisfactory physical conditions at certain mechanically ventilated schools, an inquiry has been crrried out during the past four years by Mr. E. T. Swinson, one of the Council's Inspectors, at Berner Street, Christian Street, Commercial Street, and South Hackney Central Schools.

Class-rooms for comparison were selected as nearly alike as possible in respect to size, aspect, occupation, general circumstances, and surroundings. Double control tests were frequently used; and the temperature and humidity of the external air were ascertained at the same time as the aerial state of the class-rooms. The factors investigated comprised (1) heat, (2) humidity, (3) odours, (4) air-movement. The carbonic acid pollution was not taken into account; the view being accepted that none of the symptoms produced as a result of poor ventilation is due to its presence. The observations made in regard to these factors under varying conditions of ventilation and artificial illumination are detailed below.

Fig. 1 shows the heat increment during the day under summer conditions, in which the increase in temperature inside the class-rooms, as compared with the external temperature or entering air, is solely due to body-heat given off by the occupants. Under natural ventilation, the maximum excess of room temperature is 7·5° Fahr.; but with mechanical ventilation the maximum excess is only 3·5° Fahr. The result for the naturally ventilated class-room is more favourable than generally obtained, because the means of ventilation were fully utilized.

In the case of the mechanically ventilated room, the comparison made is that between the entering air at the inlet and the room temperature itself. As the entering air was cooled by the process of washing to a point 5° below the outside air, the temperature of the room, in spite of occupation, never exceeded that of the external air.

Under winter conditions (fig. 2), the room temperature is affected by artificial heating, as well as by heat emitted by the occupants. The naturally ventilated room shows an excess at the end of the day over the external temperature of 16°; but in this total the whole of the effect of the artificial heating is included. The rise of room temperature during the day is 6°. In the mechanically ventilated room, where the air is already heated before it arrives at the inlet, the rise of room temperature is only 1°. But while the room temperature is at the outset 1° below the inlet temperature, it is at the end of the day 2° above.

Fig. 3 contrasts the conditions in two naturally ventilated class-rooms—one empty and the other occupied—under winter conditions, with direct heating in all cases, but with varying conditions of artificial lighting. Curve A gives the results in a room occupied and gas lighted; B gives a room unoccupied and gas lighted; while C gives a class-room occupied without gas light. The large amount of heat increment due to gas lighting is seen at a glance.

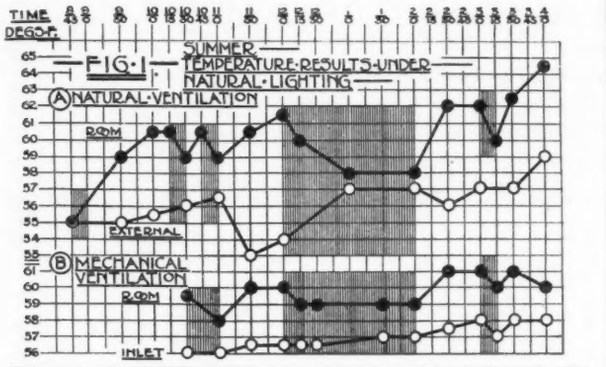
Fig. 4 shows the same thing in relation to mechanically ventilated rooms. When this diagram is compared with fig. 2, the excessive room heating produced by gas lighting is at once manifest. The room B, which was unoccupied during the afternoon, but in which the gas was lighted, had an air supply of 72,000 c.ft. an hour; yet there was a temperature increase due to gas lighting of 6°. The influence of electric lighting is shown in fig. 5.

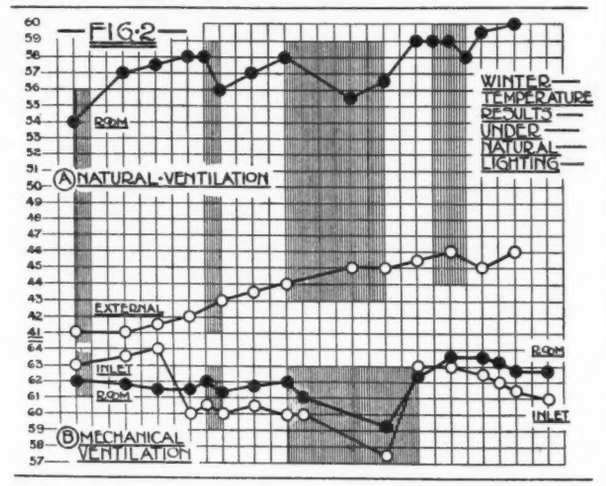
An increase of *absolute* humidity was found under all conditions of lighting and ventilation—an increase arising solely within the room from the occupants and illuminant. With natural ventilation, the *relative* humidity decreased under winter conditions to the mean extent of 14 p.ct. (occupation and natural lighting), 12·5 p.ct. (occupation *plus* gas lighting), and 15 p.ct. (gas lighted unoccupied rooms). In summer there was a mean increase of 6·3 p.ct. under occupation with natural lighting. The winter results disclose an excessive drop in the humidity, and the summer an undesirable increment. With mechanical ventilation the conditions were just reversed; for the winter conditions indicated increases up to 7·2 p.ct., while in summer there was a definite mean decrease of 10·8 p.ct.—conditions that tend towards the maintenance of a suitable atmosphere.

A large supply of air is needed to carry off the heat evolved within the room from the occupants as well as from gas lighting. Moreover, the state of the initial air supply and the condition of the room content as regards temperature and moisture markedly regulate the loss of heat and moisture by the occupants, causing sensations of comfort or discomfort.

Under mechanical ventilation, with natural or electric lighting, odours were conspicuously absent below a temperature of 67° Fahr.; whereas with natural ventilation they were frequently noticed with a temperature of 60° Fahr.—a result attributable to inadequate air changes.

In general, the inquiry leads to the following conclusions: Proper limitation of the maximum temperature, the elimination of dust, the regulation of the humidity, and freedom from odours can only be obtained by a plentiful supply of clean and otherwise suitable air. In crowded areas it may be desirable to provide





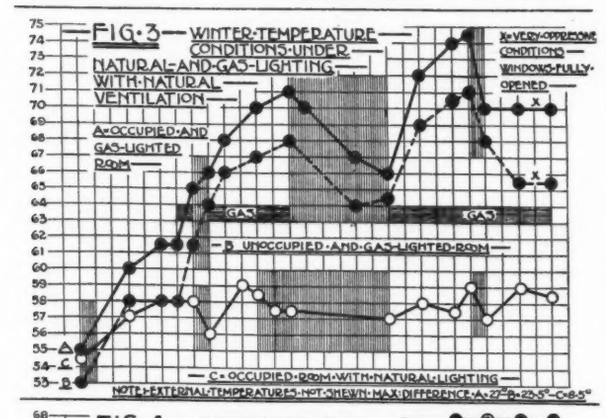


FIG. 3. WINTER TEMPERATURE CONDITIONS UNDER NATURAL AND GAS LIGHTING WITH NATURAL VENTILATION
A OCCUPIED AND GAS LIGHTED ROOM
X VERY OPPRESSIVE CONDITIONS WINDOWS FULLY OPENED
X
X
GAS
GAS
B UNOCCUPIED AND GAS LIGHTED ROOM
C OCCUPIED ROOM WITH NATURAL LIGHTING
NOTE EXTERNAL TEMPERATURES NOT SHEWN MAX DIFFERENCE A 27° B 29.5° C 6.5°

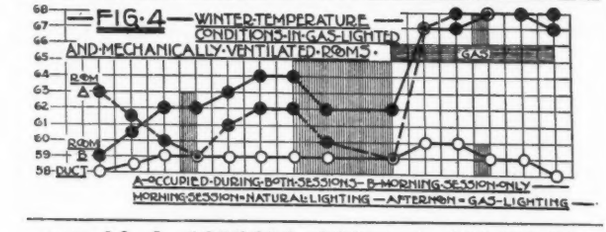
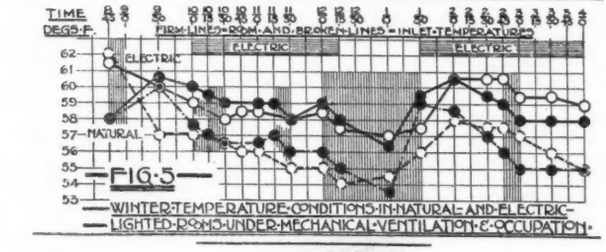


FIG. 4. WINTER TEMPERATURE CONDITIONS IN GAS LIGHTED AND MECHANICALLY VENTILATED ROOMS.
GAS
ROOM A
ROOM B
DUCT
A OCCUPIED DURING BOTH SESSIONS B MORNING SESSION ONLY
MORNING SESSION NATURAL LIGHTING AFTERNOON GAS LIGHTING



NOTES.
PERIODS DURING WHICH ROOMS WERE UNOCCUPIED SHEWN THUS:
GAS AND ELECTRIC LIGHTING.

mechanical ventilation coupled with regulated warming as also means for washing and cooling. Failing this, the difficulties in producing and maintaining proper ventilation by artificial or natural means under town conditions should lead to adopting open-air methods of education wherever practicable. If mechanical ventilation is employed, the provision should be based upon a minimum air supply per child per hour with heating surfaces capable of warming such supply to a minimum standard. If the winter minimum supply were put at 1750 to 2000 c.ft., with an initial temperature of 55°, the maximum could easily be kept under 62° Fahr. If gas is used for illumination, even with a minimum supply of 2500 c.ft. of air, the total temperature increment would be at least 10°. Heating provision should be based on warming the hourly air supply to a minimum of 55° Fahr., when the external temperature stands at 30° below this; and this provision should be made both with mechanical and natural ventilation.

LOW-TEMPERATURE DISTILLATION IN AMERICA.

Particulars of what are regarded as being the most promising low-temperature distillation processes developed in the United States are taken by the "Technical Review" from an article by Mr. C. M. Garland in "Power"—a New York publication.

Either the coal may be crushed and fed into coking forms or retorts, the resulting coke being crushed for market, or the coal is fed by a screw or other propeller through a retort, and is then briquetted for domestic use. In the Traer process, coal is charged into a vertical form, divided by partitions to produce rectangular slabs of coke, 4 in. by 12 in. by 6 ft. long. Sixteen such slabs are produced in one form. In the Bostaph process, the coke slabs form segments of a cylindrical drum, which is provided with a hollow core to carry off products of distillation. Heat is applied externally, and the gaseous and volatile products pass through perforations in the inner wall without coming into contact with a temperature higher than that at which they are distilled. When using fixed retorts of the Traer and Bostaph types, coal must be coked in thin layers—*i.e.*, the coal and coke must be handled in small quantities—and the problem is to keep down the cost of handling.

In the Smith process, the coal is propelled through a retort at 90° Fahr. and is thus converted to finely-divided coke with a high percentage of volatile matter. The product is mixed with pitch, briquetted, and baked at 1800° Fahr., which cokes the pitch and drives off most of the volatile matter remaining in the coke from the first distillation. The "G. and L." process uses propellers on a hollow shaft to drive coal through a vertical retort; the volatile products being removed through the shaft. The Traer and Bostaph processes are cheaper in first and operating costs than processes which necessitate briquetting; but the latter yield a better and stronger coke.

Masonic.

The sixteenth Installation Meeting of the "Semper Vigilans" Lodge, No. 3040—a lodge composed entirely of Chartered Secretaries—took place on Wednesday last at the Frascati Restaurant, Oxford Street, W. Mr. Horace Long, the Secretary and Accountant to the Redhill Gas Company (with whom he has been associated for over thirty years) was installed Worshipful Master for the ensuing year. The musical arrangements at the banquet following the ceremony were under the direction of Mr. W. H. Reed, A.R.A.M.

Association Meetings Postponed.—The meetings of the Midland and North of England Associations of Gas Managers, due to be held this week, on Thursday and Saturday respectively, have been postponed till further notice.

Belgian Gas Association.—The Belgian Gas Association were able this summer to resume their annual meetings, after five blank years. At a congress in Brussels, M. Degand, the Manager of the Louvain Gas-Works, was elected as President for 1919-20; and M. Timmermans, of Saint-Gilles-lez-Bruxelles, was appointed Secretary and Treasurer.

Standardization in France.—In 1918 the Ministry of Commerce and Industry in France took up the question of standardization, which had somewhat lapsed during the war; and a permanent Commission was formed. This Commission divided the work among various Sub-Committees, on two of which the Société Technique de l'Industrie du Gaz were represented—those on machine parts and weights and measures. It will be remembered that the Société were mainly instrumental, as far back as 1900, in instituting an International Commission on Standardization of Screw-Threads, which is to meet again this month. It is hoped, states the "Journal des Usines à Gaz," that the Official Commission now formed will carry on the international relations already existing, particularly as regards standardization of iron pipes. The question has been allocated to the Sub-Committee on Machine Parts, and has not yet been discussed. The Official Commission are at present inquiring into the work so far completed by the Sub-Committees.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

THE PAPERS PREPARED FOR THE POSTPONED MEETING.

In anticipation of the Autumn Meeting of the Eastern Counties Gas Managers' Association that would have been held last Wednesday but for the Railway Strike, the following two papers were prepared and circulated among the members.

WATER GAS AND COAL CONSERVATION.

By S. Moore, of Scunthorpe.

Following so closely upon the papers, "Blue Water-Gas Practice" by Mr. E. F. Keable, and "Water-Gas Plant at Colchester" by our President-elect, Mr. W. W. Townsend, I felt that, when Mr. Paternoster requested me to submit a further contribution on the same general topic of water gas, he set me a difficult task if I am expected to sustain the interest created by these recent communications to the Association.

However, water-gas is a wide and an interesting subject; and possibly some particulars of the methods and results at Scunthorpe may warrant your expert consideration to-day—especially in view of the fact that, despite the handicaps of old-style hand-charged retorts, great lack of satisfactory labour, and other obstacles to successful working, we to a large extent anticipated the recommendations of the Fuel Research Committee by actually producing, with the aid of water-gas plant, a satisfactory town's gas of nearly 12 million B.Th.U. per ton of coal carbonized, and with a total content of under 12 p.ct. of inerts.

Local Conditions.

It must, of course, be admitted that any particular standard or system of gas production would not suit every locality; so it may be well to briefly outline some of the main conditions affecting the gas undertaking at Scunthorpe both before the introduction of water-gas and afterwards.

Scunthorpe-and-Frodingham is the centre of the ironstone district of North Lincolnshire. Seldom heard of before the war, it is now said to be the "Sheffield" of the future, because of its great mineral resorces. The growth of population during the last few years has been phenomenal, and is likely to increase more rapidly, as 4000 new model dwellings on "Garden City" lines are to be erected as soon as possible. In the circumstances, the demands for gas have outgrown the limited possibilities of development at the local gas-works; the present site being unsuited for permanent extensions.

About five years ago an ideal eight-acre site, close to the railway, was purchased for the erection of a new modern gas-works. But war-time conditions intervened; and no material progress has been made with the project. Meanwhile, my predecessor was harassed with numberless difficulties in a plucky and tireless endeavour to cope with the constantly growing demands for more gas, with totally inadequate plant, and very great difficulties as regards labour.

The author took over control on Nov. 1, 1917; and within a few weeks of his arrival in Scunthorpe, he had reported in favour of proposals for the erection of a new gas-works, but strongly advocated the installation meanwhile of a carburetted water-gas plant to supplement the old coal-gas system of carbonization. His main reasons for recommending water gas were as follows:

1. The existing coal-gas plant alone could not adequately meet the present demands for gas, much less meet the increasing demands pending the erection of the new gas-works.
2. With coal gas *plus* uncarburetted water gas, the bulk output of town gas could be increased by 45 p.ct.
3. Properly used, the mixed gas would give much better thermal efficiency than coal gas per ton of coal carbonized.
4. Less dependence upon regular supplies of gas coal.
5. Better control over the local market for coke.
6. In an emergency, the water-gas plant could be started into full work on very short notice.
7. Water-gas could be used either as a diluent or as an enrichment. Thus a better standard quality of town gas could be maintained.
8. A water-gas plant would cost only about one-eighth the price of a coal-gas plant of equal capacity, would occupy less space, and could be erected much more quickly.
9. The general costs of gas manufacture would be considerably reduced.

The Plant Selected.

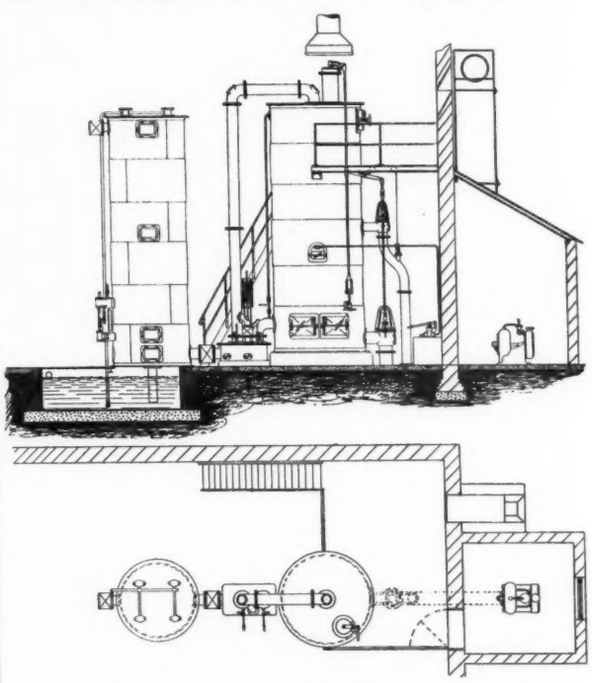
After careful consideration, the Committee decided to place an order for one of Tully's carburetted hydrogen water-gas plants of 200,000 c.ft. per twenty-four hours capacity, arranged to produce blue water-gas, to carburet with tar, benzol, or oil, or to be used for the complete carbonization of non-bituminous coal, according to requirements. This particular type of water-gas plant recommended itself to us on account of its simplicity and cheapness; and it has proved to be well-suited to the Scunthorpe method of producing a satisfactory town's gas.

The generator may be aptly described as a boiler shell with a vertical retort built inside. The retort is surrounded with chequer brickwork, and extends from the top of the generator to within 9 ft. from the bottom. The generator is 20 ft. high and 6 ft. diameter. There are top and bottom steam inlets, and top and bottom gas outlets. Both upward and downward steaming are worked in the single generator. The two 8 in. gas outlet pipes enter a wash-box where a valve on each is sealed in water. These valves are operated by weighted lever handles.

There is no separate carburettor; but about 8 ft. above the ground level are two injectors, by means of which the enriching medium can be sprayed into the incandescent coke. The plant is "blown" for about a minute and steamed six minutes. The generator is really an improved Delwik type. That is to say, the blowing is done on the Delwik principle—blowing through a shallow bed of fuel to complete the combustion; but, instead of the hot gases being blown to waste as in the Delwik plant, these are made use of to heat the upper retort and the chequer work surrounding it. The heat stored-up in the chequer work during the blow is used again to superheat the steam on the down-run.

The plant is run alternately up and down; but more frequent up-runs are sometimes made to cool-down the grate. At Scunthorpe it is the practice to steam the generator for half-an-hour before clinkering. This turns the hard clinker into a loose friable condition, easily removed.

No air-meter is used or required, as the "blow" is indicated by the appearance of flame at the stack-valve. As soon as this appears, it is evident producer gas is being generated in excess and waste is going on. This flame signal is very reliable.



The regulation of the steam is effected by means of a disc with a 5/16-in. hole, placed in a union. A pressure gauge is fixed between the disc and the steam regulating valve, so that a definite pressure of steam can be delivered to the plant.

A turbo-blower supplies the air-blast for the "blow," and also provides secondary air to the chequered chamber surrounding the retort. There are the usual snift-valve and smoke stack. The charging floor is 15 ft. 6 in. above the ground level, and is reached by an iron ladder. A coke elevator, a circulating water pump, and the necessary steam-valves and gauges complete the indoor portion of the plant. For the first eight months the coke was hoisted by hand; but a steam-driven bucket elevator and shoot are now fixed, which raise the coke and feed the generator—thus very considerably reducing the labour costs. The feeding shoot is made with a slotted bottom, so as to screen the coke while charging.

Outside the plant house (which is 25 ft. high by 25 ft. long and 14 ft. wide) is a scrubber, placed over a concrete cooling-tank which stores the circulating water for the scrubber.

The Methods Adopted.

The 8-inch connecting main between the scrubber and the relief gasholder is laid on the surface of the ground, to assist condensation and to facilitate inspection. For a distance of 30 ft. this main is submerged in water contained in a concrete cooling tank. Our two-lift relief gasholder throws 4-in. pressure, which pressure

is easily overcome by the gas generated, without the aid of an exhauster. A 4-in. steel main from the outlet of the gasholder conveys the water-gas to the far end of the foul main in the retort-house.

There is a regulating valve on the 4-in. pipe; but the exhauster governor is sufficient for all ordinary adjustments, after setting the regulating valve to pass the desired percentage of water-gas. While the "make" of water-gas into the relief gasholder is intermittent, the outflow from the holder to the foul-main is continuous. Where the water-gas main joins the foul main, the connection is made with a swan-neck, to prevent any possible back-pressure causing tar to overflow into the water-gas main. Passing steam through the water-gas main into the foul main keeps the mains clean, and at the same time helps to warm the water gas. It has been found that this gentle steaming increases the production and the strength of our liquor.

A matter to which is attached much importance is the fact that the 4-in. water-gas main is laid close down to, and for a distance partially buried in, the hot brickwork on top of the retort-bench. The water-gas entering the foul-main at a high temperature, partially prevents any deposition into (and also absorbs from) the tarry vapours therein, a portion of the hydrocarbons that would otherwise have been carried away with the tar. The coal gas and the water gas, thus meeting and blending in the foul-main while hot, continue their course through the condensers, exhausters, purifiers, and on to the store-holder.

Crisis Averted.

All through the summer and autumn of 1918, sufficient coal was not procured to secure the undertaking against a serious winter shortage; and between March and November the largest stock of coal in store at any one time amounted to only three days' requirements, and often less. Towards the end of October the shortage of coal was so alarming that water-gas making was started forthwith, although the plant was incomplete. During November, notwithstanding a large increase in the demand for gas, the coal deliveries were 200 tons less than for the previous November—so, luckily, the plant made good by adding 37 p.ct. of water gas. However, the climax of the coal difficulties was reached in December, when a total of only 314 tons of coal was received to meet a need (based upon the figure for December, 1917, and allowing for a three-quarter million greater demand for gas) for 762 tons.

With the water-gas plant working to its fullest capacity night and day, and with only thirty coal-gas retorts at work, from the 314 tons of coal 8,853,100 c.ft. of "mixed" gas was made, and 102 tons of coke was available for sale in addition to that used for the retort-house fires and the water-gas generator. As an actual fact, the quality of gas supplied at this period was far more satisfactory to the large majority of consumers than anything they had used in the month of December for several years previously.

By thus using 61 p.ct. of water-gas, a saving of 59 p.ct. of coal was effected. Tabulated, the comparative working results for the two December periods, before and after the introduction of water-gas, were as follows:

—	December, 1917. Coal-Gas only.	December, 1918. Coal-Gas and Water-Gas.	Remarks.
Coal carbonized . . . . tons	700	314	− 386
Gas made . . . . cubic feet	8,130,700	8,853,100	+ 722,200
Ditto per ton of coal. ,,	11,615	28,194	+ 16,579
B.Th.U. content per cubic foot of gas	441	419	− 22
B.Th.U. content per ton of coal carbonized	5,122,215	11,813,286	+ 6,691,071
Average total inerts . percentage	17·87	11·08	− 6·79 p.ct.
Percentage of water-gas (approximately)	*Nil*	61	+ 61 p.ct.
Coke for sale, per ton of coal used . . . . . cwt.	7·6	6·5	− 1·1

Notes to Table.

1. The coal and coke used were carefully weighed, and the total gas made was registered by the station meter.
2. The water-gas was not separately measured by meter; but careful estimates of the gas produced were made at least twice daily, based on the contents and capacity of the relief gasholder.
3. The mixed gas, as supplied to consumers, was analyzed frequently by a gas-works trained chemist, in a properly equipped laboratory, with the following average results:

H	49·83 p.ct.	419 B.Th.U. (by calculation).
CH_4	18·69	
CO	20·40	
CO_2	5·60	
O	·20	
N	5·28	

The above analysis (made in a local steelworks as a check upon the gas-works) is not so favourable as were some tests of our own at the gas-works, but may be more acceptable as being from an independent source.

Costs of Production.

The costs of gas production are exceptionally high at Scunthorpe, owing to:

1. Scarcity, and consequent high cost of suitable labour.
2. Hand-stoked retorts, and shallow settings.
3. Frequent purifier changes, owing to inadequate plant.
4. No mechanical means of handling the coal or other materials.
5. Long distance from railway, necessitating heavy cartage charges on coal, &c.

The actual net costs of gas into the holders—still keeping to the month of December, 1918, including salaries and wages on production, coal (less residuals), repairs, materials, &c., were per 1000 c.ft.:

Coal-Gas.	s.	d.	Water-Gas.	s.	d.
Coal (less residuals) . .	1	4·14	Coke used (at highest selling price)	0	6·14
Labour and materials . .	1	2·50	Steam.	0	1·00
Repairs	0	0·42	Labour and materials . .	0	4·32
Purification	0	1·31	Purification	0	0·02
Salaries and general wages	0	1·50	Salaries and wages on repairs	0	0·72
Gas used on works. . .	0	0·40	Gas used for lighting . .	0	0·09
	2	10·27		1	0·29

Proportioned according to the percentage of each gas sent out at the time, the net costs were:

39 p.ct. of coal-gas at 2s. 10·27d. per 1000 c.ft. . . =	1s. 1·37d.
61 p.ct. of uncarburetted water-gas at 1s. 0·29d. per 1000 c.ft. . . . . =	0 7·48
Actual cost of mixed gas into holder during the month of December, 1918, per 1000 c.ft.	1s. 8·85d.

General Advantages.

The foregoing particulars refer to the working results obtained during a period when, in consequence of a most extreme scarcity of coal, water gas was added to the utmost capacity of the plant. As the new year (1919) advanced, the coal supply slightly improved in quantity (but certainly not in quality); so of course, under the existing gas regulations, we were debarred from continuing to conserve coal to the greatest possible extent. It was therefore decided to produce a mixed gas of a minimum 450 B.Th.U.; and the following particulars for a full quarterly period under these conditions show that, even with poor-class horizontals (and inferior coal) *plus* water gas, very good results were obtained.

Working Results for Quarter Ending March.	1918. Coal-Gas.	1919. Coal-Gas and Water-Gas.	Remarks.
Coal carbonized . . . . tons	1,775	1,200	− 575
Total gas made . . . cubic feet	20,368,900	24,647,600	+4,278,700
,, ,, per ton of coal. .	11,475	20,538	+ 9,063
Gas accounted for per ton coal, cubic feet	9,541	18,290	+ 8,749
B.Th.U. content per cubic foot of gas	448	450	+ 2
B.Th.U. content per ton of coal carbonized	5,140,800	9,242,100	+4,101,300
Coke for sale, per ton of coal, cwt.	8·65	7·39	− 1·26
Approximate percentage of water-gas	*Nil*	49	+ 49

The 1919 results speak for themselves; and the financial benefits may be judged from the fact that we are selling gas at the comparatively low price of 4s. per 1000 c.ft., although our labour charges on retort-house work alone amounted to 1s. per 1000 c.ft. of coal-gas made during the period reviewed.

A matter of equal importance with selling price is the quality of the gas supplied. As only 1 p.ct. of the gas is used for lighting by means of flat-flame burners, no attempt is made to cater for this class of custom. To do so with pre-war illuminating gas, would necessitate a charge of about 7s. per 1000 c.ft. to enable us to merely pay expenses. The other 99 p.ct. of consumers are far better satisfied with present-day arrangements, than with the stretched coal gas formerly supplied.

Whatever may be claimed in favour of air mixtures obtained by injection, certainly not one Scunthorpe gas consumer in every thousand would care to revert to the so-called "straight" coal gas of recent years, and which sometimes contained as much as 27 p.ct. of inerts.

The aim is now to produce a combustible gas, of regular pressure and quality, with a low content of inerts, which ensures at least two important benefits—an undoubted conservation of coal, and good value for the consumers' money. But concurrent with the supply of a satisfactory gas to the town, the undertaking has benefited in other directions from the use of water gas. For instance, all the usual advantages of lower heats in the retort-house have been secured, including the elimination of pitch and naphthalene troubles. Lower heats also mean less wear and tear on the setting, less waste of fuel, less trouble in clinkering, and less discomfort generally for the stokers. Not least, where efficient labour is expensive and difficult to procure, the use of water gas has reduced the need for skilled men in the retort-house, and has cut-down the expenses for purification and for general yard-work very appreciably.

On the district, the advantages accruing from the extensive use of water gas are no less apparent. In addition to the benefits to the consumers already mentioned, there is also the undoubted fact that a wide variation in the proportion of water gas may occur without any noticeable effect at the consumers' burners, so long as the pressure is good. It is otherwise with rich coal gas, and with "aerated" coal gas.

With high heats and a high "pull" (and a consequent high proportion of inerts) there is frequently much trouble experienced with naphthalene, oxidation of services, and "bound" meters.

Since introducing the coal-gas *plus* water-gas blend at Scunthorpe, all complaints of this class have entirely disappeared.

ADVANTAGES SUMMARIZED.

To sum up the advantages of the use of water gas at Scunthorpe, our experience is that:

1. Properly utilized, at least 61 p.ct. (probably more) of uncarburetted water gas can be blended with coal gas to carry an unusually high proportion of the heat units of the original coal to the consumers' burners.

2. By producing a blended gas as above, at least 59 p.ct. of the coal otherwise required for gas-making can be saved, if this becomes permissible, in accordance with the recommendations of Sir George Beilby's Fuel Research Committee.

3. The mixed gas, *plus* the coke remaining for disposal, represents more than 21 million B.Th.U. readily available for use per ton of coal carbonized.

4. With ordinary adjustment, the average incandescent gas-burner will give a more brilliant illumination, and cookers, engines, and other gas-burning appliances a higher efficiency, when using a properly mixed gas, regular in quality.

5. The mixed gas can be produced and sold more cheaply than coal gas.

6. All these advantages may be secured by the use of ordinary horizontal retort-settings of any type, with the addition of a blue water-gas plant of simple design.

CONCLUSION.

The foregoing statements are the result of actual experience, and can be reproduced anywhere—in even the least up-to-date gas-works. They are not put forward as ideal attainments, but rather to modestly indicate the tremendous potentialities of improvement and development existing in every gas-works in the Kingdom.

POST-WAR PROBLEMS.

By C. E. WRIGHT, of Ipswich.

An invitation to read a paper before the assembled gas engineers of the Eastern Counties is a matter for careful consideration; and when it came my way I was tempted to plead lack of suitable material. Apart from gas output, we cannot claim to have made any very great strides at the works which I have been managing since 1914; and it was only the consideration that neither have the majority of other works that impelled me to make the attempt to add to the valuable store of information already at the disposal of the Association.

FROM WAR TO PEACE.

Only those managers who were in the direst need have been able to instal new plants or new processes; and now that the great struggle has ended successfully, we find ourselves five years behind in our developments. The gas manager has been one of the hardest workers of the war. Every hour of his time has been full of grave anxiety; and he may be excused if he expresses very modestly, as is his way, a certain amount of pride in his achievements. Peace, which arrives to put a welcome end to the deaths, destruction, and disasters of modern warfare, will have an immense influence over him and his works; and he cannot afford to ignore the signs of the times by carrying on in the old way. The obstacles he has surmounted are small by comparison with those ahead. There is no peace for him. There is coal to be obtained, at a price; there is labour to be secured, at a price; there is the increased cost of every commodity; and there is the lower quality of his raw material. Then, standing over him, demanding pre-war gas, or better, and at pre-war price, is his greatest friend, the consumer. For the benefit of this latter gentleman (or lady), he has to keep his mains full of a gas that is suited in every way for any uses to be reasonably expected of it.

A CLEARER DEFINITION OF VALUE WANTED.

Such a gas is not easily described. Our technical terms "candle power" and "B.Th.U." are scarcely equal to the task; for I have known a high candle power gas that received nothing but abuse from the consumer, and B.Th.U. seems to the average consumer to be far too technical. "Inerts" he knows nothing of; and so long as his gas will quickly and efficiently boil his kettle or shaving water, he is quite satisfied. If it won't, it is no use telling him it contains only 12 p.ct. of inerts, or that it is 493·6 B.Th.U. He simply assumes that you are evading the issue. We must try to find a clearer definition of the value of our gas for the consumer. From the gas manager's point of view, a straight gas, without air admission, composed of 25 p.ct. of carburetted water gas, testing 480 B.Th.U. and 15 c.p. (No. 2 burner), should be quite suitable for all normal usage; and if this gas can be made cheaply and distributed, all is well even to-day.

In trying to turn out this gas at Ipswich, we have made many valuable mistakes which have been good experience, and I propose to try to imagine sections of a model works, using all useful data we have accumulated at our works. My object is to help those managers who have not had such varied experience, and to draw from those who have some information of an instructive nature. We can see ahead huge expansion of area and business; and this, coming upon our records of the past eighteen years, keeps us perpetually on the move in the right direction. A few figures here might be interesting to those members who care to compare notes.

Year.	Consumption.	C.W.G. of This.	Coal Used.	Make per Ton.
	C.Ft.		Tons.	C.Ft.
1900 . . .	321,000,000	*Nil*	31,500	10,200
1913 . . .	545,000,000	99	36,000	12,300
1918 . . .	644,000,000	133	36,000	14,100

It will be noticed that in 1918, for 511 million c.ft. of coal gas, we carbonized the same coal tonnage as for 446 millions in 1913. The outstanding point about our output has been the relation of night and day consumption. It is a fact that during my association with the Company these two twelve-hour consumptions have been showing a tendency to be completely reversed. Thus:

In January—

Year.	Total Consumption.	Day.	Night.	Coal.	Gas.	Daily Average Consumption.
	C.Ft.	P.Ct.	P.Ct.	Tons.	Per Ton.	C.Ft.
1900. .	40,000,000	49	51	4200	9,600	1,290,000
1913. .	58,000,000	55	45	3960	12,095	1,870,000
1919. .	64,000,000	65	35	3364	14,200	2,060,000

The total gas made per ton of coal, including carburetted water gas, was, in January, 1913, 14,000 c.ft., and in January, 1919, it was 19,000 c.ft.

In June—

Year.	Total Consumption.	Day.	Night.	Coal.	Gas.	Daily Average Consumption.
	C.Ft.	P.Ct.	P.Ct.	Tons.	Per Ton.	C.Ft.
1900	18,500,000	49	51	1780	9,950	610,000
1913	35,000,000	60	40	2340	12,500	1,160,000
1919	46,000,000	70	30	2480	14,300	1,530,000

Total gas per ton in 1913, 15,000 c.ft.; in 1919, 19,000 c.ft.

CHANGING CONDITIONS OF THE APPLICATIONS OF GAS.

These few figures are a signpost on the way. Other places may not have had the same developments in quite the same way; but I believe the tendency will be on the lines indicated. Our commodity is going to be used in increasing quantities in a direction quite different from its original object—lighting. The so-and-so gaslight company will ultimately become a misnomer; it will be the heat, power, coke, and light company. The flat-flame burner is almost a past memory; and it should be hurried out of existence at the earliest possible moment, excepting where it is obviously desirable. It is uneconomical from the consumer's point of view, and it does not take into consideration the heat value or power value of the gas—merely acting as an indicator of the actual naked lighting value, which, as already mentioned, is not by any means a gauge of its true value.

COAL HANDLING.

The gas-works itself feels these changing conditions much more than the other departments of the Company; and the works manager is generally living to the extent of twelve months or so in the future. Otherwise he would surely be "caught napping." The first item on the works is naturally coal. We have had many sorts of coal at Ipswich, some of which I am trying to forget; for it was more suitable for concreting than gas-making. But the Northern coals we have been fortunate enough to secure have been splendid—always full of gas and tar of the highest quality. I should specify these coals, though, of course, there are others as good which we have not used. [Economy in the purchase of coal may be a bad policy.] The system we have of coaling our retort-houses I consider mechanically and economically perfect, in all essential details. This system is the legacy of Mr. J. T. Jolliffe, and forms a suitable monument to his engineering ability. There are two 2-ton hydraulic cranes with Hone's grabs (18 cwt. capacity), and a system of plate conveyors which are capable of dealing with 150 tons per hour. There are three conveyors, which give an "untrimmed" storage of 6000 tons. We can discharge a 1000-ton steamer in twelve working hours, and use the same apparatus for truck discharge. Our experience of coal is that it cannot be better handled than by cranes, grabs, and conveyors if seaborne, and by elevators and conveyors if railborne. I believe in a coal-breaker at this point, for the reason that to work a coal-breaker 365 days a year, breaking 20 p.ct. of the coal, is uneconomical; whereas to divide the incoming coal by grids, and break the large coal during the few hours of unloading boats or trucks is to the advantage of all concerned, and must be a great economy of power. This method is impracticable at Ipswich.

COAL TO RETORT-HOUSE ELEVATORS.

This work is almost universally done by manual labour; and I do not know of any works where barrows have been replaced. But where the coal-store will allow, I see no insuperable objection to a radial conveyor on the belt principle; the bottom belt being the carrier. Where there are numerous stanchions on the coal floor, as at Ipswich, I think an adjustable spiral trough conveyor, capable of being lengthened or shortened at will, and

working radially from the crusher or elevator could be made into a business proposition; and I hope to have an opportunity to experiment with it before long.

Verticals or Horizontals.

I could have placed before you a long paper on verticals, of which we have a modern installation, erected in 1913-14; but so few engineers in our section are directly interested in verticals that I felt it wiser to give only a brief comparison of the two systems. The reason I interpose it here is that coal storage depends somewhat on the system of retort we adopt.

The advantages of verticals with us at Ipswich are as follows: The make of gas per ton of coal is excellent. There is no stoking machinery working day or night; and the coke-extracting plant is very simple. The make of gas per retort runs from 40,000 to 60,000 c.ft. per 24 hours.

The disadvantages are great; but the results will pay for a lot of trouble. Stoking costs are higher than with horizontals; but this is because we use a coal which is bad for verticals and requires continuous encouragement in its downward course. We could easily use a shrinking coal more suitable for the system; but then our make per ton would be around 12,000 c.ft. Our gain of 2000 c.ft. per ton of a really good gas seems to me to more than compensate for the cost.

The fuel consumption per 100 lbs. of coal carbonized is higher than horizontals. The cessation of work on Sunday is a very difficult problem; and we do not attempt it at Ipswich. Repairs and maintenance of settings is considerably higher than horizontals. I estimate it at 20 p.ct. But against these drawbacks there is a largely increased make of gas per ton. The conclusion I come to, therefore, is this: That where one can operate verticals as we do at Ipswich, using good gas coal, and can be sure of getting (say) at least 1000 c.ft. more gas per ton of coal, vertical retorts are well worth while. Personally, I lean to intermittent retorts, though my experience is only of continuous ones.

Coal Storage.

The only difference between the requirements of verticals and horizontals is that in vertical installations provision has to be made for sending both coal and coke up to the top of the house. It should be insisted on that both coal and coke systems are interchangeable; so that if either system fails, the other can be used for both needs in the emergency. Therefore, the coal store should be easily accessible from this point of view.

While on the subject of coal in bulk, I may mention that we have found a rather useful expedient in the event of large coal fires. We drive a tube down into the heart of the heap of the fired coal, generally in such a position as to head-off the fire from the other heaps; and down this tube strong sulphuric acid is poured, followed by strong sodium bicarbonate. The generation of CO_2 in the heart of the coal heap seems to have a very striking effect on the tendency to fire. We have used this device with success on several occasions.

In horizontal houses, the coal storage is undoubtedly best held in overhead hoppers. I am hoping to hear of a successful retort-charging device on the lines of a direct curved shoot from overhead hoppers fed by a suitable cut-off valve, and projecting the coal into the retort purely by the velocity of its fall. It seems to be a practical idea, and one wonders whether it is successfully used at any works.

Horizontal Retorts.

Before we can determine the best type, size, and system of retorts, we should examine the prospects for the future. Is the labour difficulty going to alter all our views and deductions on this matter? For instance, are we to be forced to adopt 24-hour charges, a ton or more a time, doing all the retort stoking in 8 hours, and having only furnace men for the other 16 hours? It is evident that if we are to have two or three gangs of stokers doing spells throughout the 24 hours at equal intervals, of only a few minutes' duration with up-to-date machines, we are working uneconomically, and we must perforce modernize our methods if we are to produce cheap gas. This is a difficult matter to experiment with. But I am able to say that during the 1916, 1917, and 1918 winters, owing to the air-raid restrictions, and our inability to prevent flashing from the retorts when spells were on, we did away with all night work in our horizontal house by the following scheme: At 6 a.m. we pushed out and charged up the whole three settings which were at work, leaving cold coke for the furnaces; and at 4.30 p.m. we repeated the process, giving the retorts heavy charges to last out the 14 hours. This scheme was quite successful; the only disadvantages being the long arduous spells from the men's point of view, and the patches of poor gas at the end of each phase, which required careful attention. Then there is the fact that if it is desired to run more beds, this scheme becomes unworkable, owing to the time taken over spells. The general results were excellent. We noticed no ill-effects whatever, apart from those mentioned. The make per ton was fully maintained, the quality was quite good, and there was a decided gain in running the stoking plant for the two periods only out of the 24 hours. During this period we had two separate weeks' record of coal gas make for the plant involved, which speaks well for the arrangement.

Could the whole of a horizontal house be discharged and charged with sufficient coal for 24 hours in eight hours, and give satisfactory working results, I incline to the opinion that this will be the basis of future practice in horizontal and intermittent vertical retorts holding 30 cwt. of coal. The ideal retort stoking machine will, for these conditions, be the "D.B." pusher and projector, driven electrically. The one-action machine appears to me (inexperienced though I admit I am) to gain nothing, and to show some disadvantages which I do not care to face. I like to have more complete control of the measurement of the charge, and prefer the coal well off the mouthpiece. I cannot see how these points can be secured so successfully with the one-action machine.

Power Plant.

Experience and consistency should make a gas engineer go for gas-engine plant wherever possible. I consider that gas-engines form the best drive for coal-breaking, elevating, and conveying plant, coke-distributing plant (except where power is required high-up on a staging), and for general machinery. But it always should drive through long belts; and the engine should be in a clean airy room, with the pulley-and-belt drive if possible outside the room.

For retort-house machines, coke-breakers on high stagings, and isolated single-action machines, electricity is the power; but it presents difficulties to any but an expert. It needs special arrangements in every way, and will never be a success if it is dropped into a dust-laden corner and left there to itself in the old-time gas-works way. The cheapest electric power comes from the town supply, especially for small works; but where this is undesirable, power plant should be erected. The latter will, of course, be in an airy, cool room, free from dust, and especially free of H_2S laden gas. The main cables will be taken from a main switchboard in this station to a distributing board from a few feet to it may be hundreds of yards away, and will there be divided up into small systems; each feeding its motor through the usual instruments. My reason for this main cable idea is that we had fourteen cables from our main switchboard running underground; and the result was endless trouble and stoppage, and searching for cables and distinguishing them as they entered and left the ground. After bearing this for some months, we decided to clear the whole lot out, and have two main cables overhead across the yard, and a distributing board in the retort-house. The necessary fittings were designed by ourselves; and the result has been complete freedom from electric distribution trouble of any sort whatever ever since. Moreover, in the event of such trouble, we can locate it in a few minutes, compared with two or three hours or more under the old system.

Armatures, whether of motors or dynamos, should be taken out and cleaned every half year; and motors should transmit their power through a long, slack belt if possible. I consider a direct gear drive is quite unsuited to the delicate mechanism of an electric motor; and wherever the contractors have supplied these, we have been compelled in the end to reorganize the drive. A motor should have plenty of margin of power, and should never under any pretext be overloaded, or subjected to any uneven running, jarring, or sudden stoppage. This is why I choose belting to transmit electric power. There is the necessary cushion between the armature and its work. It is astonishing under what unsuitable conditions a motor will run. It is, however, a wise policy to give it every possible chance, when it will repay you by going on, month after month, with ordinary attention, and it will rarely let you down.

We are just replacing a 17 h.p. motor (direct-gear driven) by a gas-engine driving through shafting and Hyatt roller bearings, which appears to be an ideal arrangement.

Lastly about motors. Specify always, wherever possible, the same make and same power motors; so that you always have spares, and you can sacrifice a less important one for the sake of a vital one in case of dire necessity.

Heats and Furnaces.

Given good coal, the successful and economic production of gas depends entirely on heats. I am wondering whether the day of the retort-furnace is over, and whether we shall all be making our gases for retort heating in a separate plant. I designed settings many years ago on the system of one furnace supplying four settings, and they were used by one of the large London gas companies; but I was never able to make further inquiries into the results. The Tottenham Company have been trying a system of producers running on breeze; but I fear breeze is unsuitable for the job. I should like to hear from anybody who has gone carefully into this matter, and has used the Mond or Dowson and Mason gas producer with non-clinkering grates.

The gain realized, by avoiding the necessity of a multiplicity of producers and furnacemen and doubtful heats, due to bad coke and heavy clinkering-up, seems to be worthy of much research. At Ipswich, we have adopted a type of furnace which is known as non-clinkering, and is working quite satisfactorily. This particular furnace has not been "harded-out" for some six months. This is certainly progressing in the right direction, more especially as it has enabled us to get better heats out of bad coke, as it was merely the "clinkering" which prevented us doing so in the past.

Stoking Machinery.

For normal horizontal work I have had experience of many types of machines, manual and power; and I cannot say that I have seen any power machine better than the "D.B." that we use to-day. The only improvement that I would make would be to have two machines—one a discharger and one a charger. I should not then be so awkwardly placed if the travel armature

or gear gives trouble, which at present means stoppage of both processes for a length of time, depending on the nature of the breakage or trouble. This machine, with a two-length pusher and the projector in correct order, will discharge and charge-up a retort-setting quite as speedily as, and probably a shade more evenly than, any other machine. The grades of coal from fine to nutty give trouble at times; but the machine-man can, with intelligent foresight, generally combat the difficulty. We nearly fill our retorts, keeping the coal well off the mouthpiece. I almost forget what a real blocked ascension pipe is. Our top apparatus is normal; but we have removed the retort-house governor of the vertical house outside the building, with marked advantage.

Coke-Handling.

My views will clash with those of many an able engineer when I vote for conveyors for coke distribution everywhere. I am convinced that conveyors are the most economical and best method. My experience runs to barrows, cranes, telphers, bogeys, and conveyors, and the last-named have been the most successful. There is an impression that conveyors break the coke unduly. This is quite erroneous. A well-designed conveyor does not break the coke in the slightest degree while dealing with it. There is a certain tendency to break, on receipt and discharge, the coke; but this is less in my opinion than in any other method. Where the coke is dropped in small quantities, as it is from a conveyor, the breakage is much less than when dropped from a bucket or a telpher at from 5 cwt. to a ton a time. This we have proved conclusively, as we have at the present time both methods in daily use.

Some argue against a conveyor that its life is only a few months—a year at the most. Conveyors become out of pitch in a year; but by temporarily increasing the pitch diameter of the driving sprocket by longer teeth with shoulders, a conveyor has lasted with us four years before being utterly worn-out. Finally, the strongest arguments of all in favour of conveyors are that, once the machinery is in motion it does its work without attention, without any labour cost whatever, and it feeds a rotary screen or a breaker with small quantities of coke at regular intervals, and thus provides perfect arrangements.

General Plant.

From the retort-houses the gas passes to a water-cooled condenser, erected 1919, which it reaches at a temperature of about 106° Fahr. and leaves at about 70° Fahr. The water is from the works mains; and the supply would be very expensive but for the fact that we use the outlet water which is at about 86° Fahr. for our boiler feed, through a water softener. The position of this condenser, working under vacuum, is open to question; but I argue that the less plant we have on the pressure side of the exhauster the less total pressure we get, and thus we eliminate much gas loss by pressure. Five years ago I ran through a winter, forcing gas against a total pressure of 60 in. to 80 in. at the exhauster outlet (the loss of gas from seal-pots blowing, &c., was undoubtedly considerable). Last winter we had reduced this to 40 in.; and we are hoping to get even lower than this.

Our exhausters are normal. The only modern development here is to run one exhauster steam governed, so that we can parallel it with either of the others, and thus avoid a tendency to irregular vacuum, which ensues if two vacuum governed exhausters are paralleled. We maintain a vacuum of 6 in., because we have found by experiment that this enables us to keep a very steady vacuum on both retort-houses; whereas a lower exhauster vacuum gives a more irregular retort-house vacuum through the governors.

The gas passes to a Livesey washer, which, now that tar washing is discontinued, has once more become a valuable piece of apparatus from the purely gas-making point of view; and by running a small stream of water through it, we are gaining in cooling, and in the scrubbing and collecting of ammonia. Two Holmes washer-scrubbers come next in our circuit. The first of these is fed with 4-oz. liquor, which leaves at 8-oz.; the second is running clean water, and the outlet liquor is 10-oz.

The gas passes through an 18-in. overhead steel main, recently fixed, to a set of modern purifiers that give a working area of 1800 sq. ft. on our maximum make of three millions, or 0·6 sq. ft. area per 1000 c.ft. per 24 hours. These purifiers are worked by Weck's valves in rotation; and we find it to our ultimate advantage not to admit any air, and to change them every four months, instead of twelve months, partly because they require, after twelve months' work, concrete spikes, and sledge hammers, and partly because lack of air necessitates more frequent changes. I have in the past admitted as much as 5 p.ct. of air to keep them at active work; but I feel sure the ill-effects of this dilution cannot be defended.

We then pass on to the station meters, which are of the usual type.

Our gasholders are 1 million and ¾ million capacity; so that it will be seen that we are sitting upon a volcano as regards storage. But until there is some hope of a return to normal in the gasholder manufacturing trade, we shall have to carry on.

Distribution.

The supply of gas to a town of 80,000 people is a very simple problem compared to that of some of my friends who have much greater areas and larger systems to feed. But it is becoming (like most other gas practice) a science; and we are all faced by the inadequacy of past estimates of our requirements. No man could have foreseen the wide expansion and immense changes that have come over this department of a gas company. To illustrate the point, I will give a few figures from our experience:

Output per Hour.

—	Jan. 19, 1909.	Dec. 3, 1915.	Dec. 8, 1916.	Nov. 9, 1917.	May 16, 1919.	June 21, 1919.
	C.Ft.	C.Ft.	C.Ft.	C.Ft.	C.Ft.	C.Ft.
6 a.m. to 7 a.m.	56,000	93,000	63,000	79,000	74,000	..
7 a.m. to 8 a.m.	85,000	99,000	109,000	114,000	101,000	..
8 a.m. to 9 a.m.	70,000	119,000	118,000	87,000	89,000	..
9 a.m. to 10 a.m.	72,000	97,000	90,000	82,000	71,000	..
10 a.m. to 11 a.m.	73,000	97,000	99,000	102,000	98,000	..
11 a.m. to 12 noon	74,000	128,000	131,000	140,000	131,000	158,000
12 noon to 1 p.m.	80,000	156,000	165,000	157,000	170,000	213,000
1 p.m. to 2 p.m.	45,000	108,000	93,000	117,000	103,000	135,000
2 p.m. to 3 p.m.	45,000	82,000	83,000	84,000	88,000	110,000
3 p.m. to 4 p.m.	50,000	86,000	78,000	90,000	71,000	78,000
4 p.m. to 5 p.m.	86,000	148,000	149,000	94,000	76,000	73,000
5 p.m. to 6 p.m.	168,000	171,000	165,000	147,000	84,000	68,000
6 p.m. to 7 p.m.	158,000	127,000	147,000	142,000	74,000	72,000
7 p.m. to 8 p.m.	146,000	142,000	142,000	134,000	68,000	..
8 p.m. to 9 p.m.	130,000	130,000	133,000	123,000	71,000	..
9 p.m. to 10 p.m.	110,000	120,000	122,000	108,000	91,000	..
10 p.m. to 11 p.m.	85,000	90,000	98,000	82,000	88,000	..
11 p.m. to 12 midnight	42,000	29,000	42,000	29,000	27,000	..
12 midnight to 1 a.m.	23,000	20,000	26,000	30,000	22,000	..
1 a.m. to 2 a.m.	22,000	16,000	27,000	24,000	18,000	..
2 a.m. to 3 a.m.	15,000	27,000	30,000	32,000	22,000	..
3 a.m. to 4 a.m.	21,000	22,000	19,000	24,000	15,000	..
4 a.m. to 5 a.m.	25,000	21,000	33,000	22,000	25,000	..
5 a.m. to 6 a.m.	40,000	38,000	37,000	39,000	40,000	..
Day . . .	906,000	1,384,000	1,343,000	1,293,000	1,156,000	..
Night . . .	817,000	782,000	866,000	789,000	561,000	..
Total . . .	1,723,000	2,166,000	2,209,000	2,082,000	1,717,000	..

Note that on June 21, 1919—a hot summer day—maximum and minimum temperatures (76° to 54°), the output from 12 to 1 p.m. was at the rate of 5,100,000 c.ft. per day, and for the three dinner hours, 11 to 2 p.m., at the rate of 4 millions per day. Can one wonder if a system designed to carry a maximum of 3 millions per day, and barely equal to that, should show weak spots when asked to deal with gas at the rate of 5 millions per day. This extraordinary feature is thrown more clearly into focus by the fact that in January, 1909, only ten years ago, the average for these hours was at the rate of 1,600,000 per day. The moral of this abnormal expansion is never design any modern distribution systems until you have ascertained the greatest hourly output.

I have deliberately avoided, where unessential, long columns of figures, or any detail matter that could confuse the points made, and have made brevity my aim.

Steaming Retorts.

In regard to the steaming of retorts, this is an extremely wide subject; and until I have had more experience of the matter, I dare not say whether the manufacture of 30,000 c.ft. of gas per ton of 350 B.Th.U. is a paying proposition, more especially where it has to be brought up to 480 B.Th.U. before distribution. It is certain our verticals (with barely adequate heats normally) will not stand any treatment that tends to minimize the heats. But I may have something to report at a future meeting on this question.

The Manager's Position.

The post-war gas manager, aged beyond his years by the increasing strain of the sad and anxious fifty months of warfare, has now to turn his attention to many problems of an exceedingly difficult nature, such as I have briefly outlined. He must be an expert in gas making, engineering, building, electricity, hydraulics, air compression, chemistry, steam, water-softening, petrol engines, heat, light, power, conveying machinery, and he must be a good draughtsman, geometrician, and surveyor. It is no wonder, then, he is rarely offered less than £150 per annum, though attempts have been recently made to get down to this figure.

The Assistant.

Adequate supervision pays for itself over and over again; and the gas manager cannot do justice to the future if he is worried to distraction by the present. I hold that over-supervision is a less expensive mistake than its reverse, and where a works is large enough to accommodate assistants almost as capable as is the manager himself, the wise course is to pay the highest price and have the best assistance possible. I go further than this; for I believe that it would pay the largest companies to employ a first-class gas engineer as a "thinker"—to have no routine work whatever, but just to scheme and devise economic plans for working and for the future. It may be argued that they do so provide in the engineer and manager; but I have not so far met the manager of a large works whose time is not fully occupied with turning out the gas for the day, and who has not the greatest difficulty in devising extensive future developments owing to the pressure of the present post-war anxieties.

I have to thank Mr. Frank Prentice, the Engineer and Manager of our Company, for his assistance, advice, and access to necessary figures, &c., not to mention the 18 years of my business life, which he has so kindly and thoughtfully controlled. If all pupils had the same consideration and friendliness that I have had from all my superiors at Ipswich, the world would be a much more pleasant place for "budding gas managers."

OFFICE ORGANIZATION.

By W. C. Jackson, of Neath.

[A Paper read before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, Sept. 24.]

While it is very essential that technical matters pertaining to the manufacture and distribution of the commodities we have to sell should hold first place in our meetings and discussions, it is also, I consider, very wise that we should, upon occasion, take up such a subject as the organization of our office work. By doing so, our minds are kept from running into grooves and channels of pure technical thought, and diverted on to the commercial and business aspects of our many-sided business.

All the large modern highly-organized businesses are characterized by the great exercise of plan and forethought, which has been brought to bear upon every detail of their operations, including to a very marked degree their office organization. The executive heads of these firms have fully realized that, without a thoroughly organized and capable office staff, their business can never attain to its fullest success. Right in the forefront of successful organization stands the absolute necessity for definite detailing of the duties of staff members; so that overlapping of authority, differences of opinion as to responsibility for carrying out certain work, &c., are entirely eliminated. Incidentally, this definite detailing of duties saves the manager much valuable time, as he is kept clear from petty interruptions upon small and trivial matters which could equally as well be dealt with by some junior member of his staff.

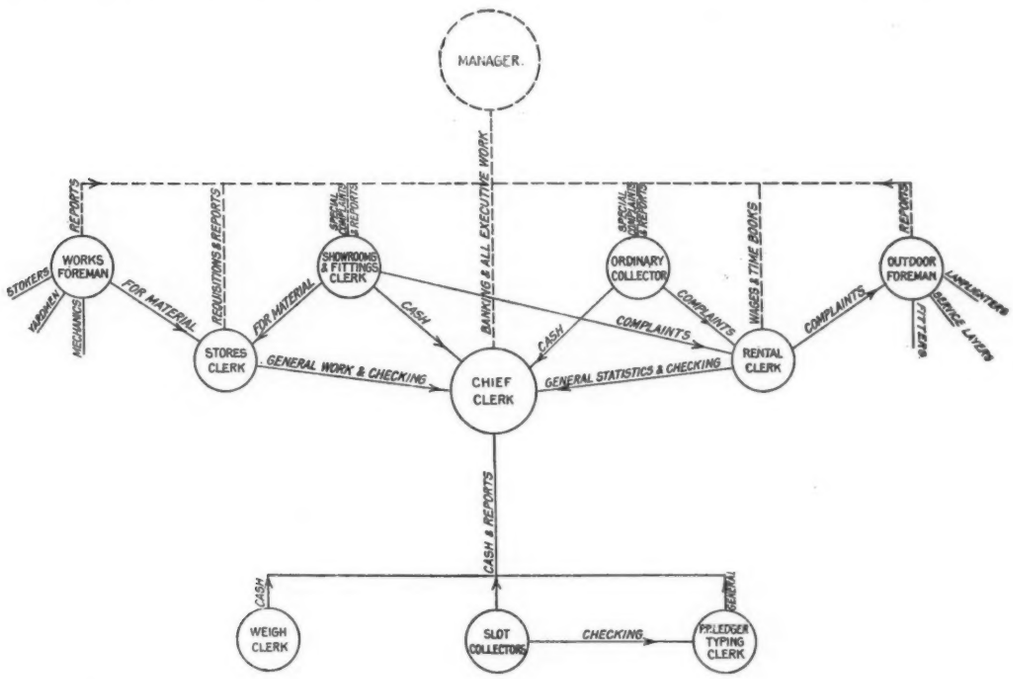
In this connection, I personally favour the drafting-out of a chart whereby the position the staff members hold in relation to the manager, secretary, chief clerk, accountant, &c., is shown. Such a chart [reproduced], hung in the office, enables every staff member to know exactly to whom he is to go for getting certain matters settled; and thereby the office wheels are kept running much more smoothly. The chart is suitable for a medium-sized gas-works; and upon inspecting it, you will all readily see how the lines of communication run back to the manager—in some cases direct, in others only through the departmental head. This pyramid of subordinate authority keeps the manager above the routine, and in command—giving him the necessary freedom to decide policies and to plan ahead for future work.

To get the best from any office staff, it is very essential that they should be working in a well-ventilated office, with proper provision made for ample lighting of their desks, heating of the office in cold weather, and desk or table, with sitting accommodation, designed to enable the clerk to carry out his work with as little fatigue of body and eye as is humanly possible. A little scientific forethought in these matters helps very materially to increase production.

Office work divides itself into two general categories—first, that relating to accounts, second, that having to do with the mere forwarding of business transactions. As modern business has developed, this work has come to be divided into specialized parts, which, in large offices, become sub-departments, and over each of which are set departmental heads. In a gas-works office, these divisions would naturally fall into, and include, the following:

(1) *Purchasing Department*, for the handling of records of quotations for material, following up purchase orders, keeping stock records, &c.
(2) *Order Department*, for the handling of all orders from consumers as they are turned in from the show-rooms, canvassers, or customers direct, and all records kept of same until the transactions reach the accounting department.
(3) *Sales Department*.—This would deal with the clerical work of handling records of sales of apparatus, rental of gas, &c.
(4) *Collections Department*.—This would deal with the collection of gas accounts, fittings accounts, residual accounts, and all other moneys.
(5) *Accounting Department*.—This would deal with the book records of all transactions with persons who have money relations with the undertaking, the handling of money, the general ledger work, &c.
(6) *Correspondence Department*.—This would deal with the handling and sorting out of correspondence for the different departments, filing of letters, &c.
(7) *Manufacturing Records Department*.—This would deal with the records of manufacture, and analyzing-out of all working costs, &c.

It is almost impossible, in opening a discussion, to deal in detail with these different individual departments; but a general survey of the routine methods, as developed at Neath, may provoke other members into giving the meeting their views of office organization, and so be of benefit to many who, like myself, are always looking out for any improved methods of carrying on one's business.



Purchasing Department.

All purchases are made direct by the manager; official orders being given out in each particular case. These order forms are in triplicate. The top sheet is sent forward to the firm receiving the order; one copy being filed in the manager's order file, and one copy passed on to the stores clerk. This keeps this clerk conversant with all purchases made, and he is thereby much more able to check incoming goods. Where quotations are dealt with, these are passed on to the chief clerk, who sets out the prices quoted in tabular form, and, after completion, returns the quotations and the tabulated prices to the manager for him to deal with.

Order Department.

This is under the charge of the rental clerk, whose duty it is to see that all orders as they are received are immediately entered into the complaint book. Orders are received in many different ways—namely, from show-rooms, collectors, outside foremen, and by letter. I have, however, found it advisable to make one man responsible for the entering up of these into the complaint book. The complaint book is on the carbon duplicate system, and is made up with the top sheet giving a permanent record, and the carbon undersheet in card form, perforated to allow of these cards being torn off by the fitters' foreman for handing out to the fitters. The permanent records are inspected by the manager weekly. It is therefore impossible for any job to be overlooked.

Sales Department.

This is in the charge of the chief clerk; but the work is actually

carried out by the rental clerk and the show-rooms and fittings' clerk. All apparatus sold is recorded as fittings, and the items are posted into the rental from the invoice book, after this has been made out. This provides a check on the totals, as quarterly summaries have to agree between the rental fittings column, invoice book, and time-sheets day book. Our time sheets are so arranged as to also take the place of a day book; and these are filed as such each day. The invoice book is on the carbon duplicate system; each page containing eight invoices, the under page suitably lined to enable the carrying forward of the daily totals.

Collections Department.

This is in the charge of the manager, to whom the collectors, both ordinary and slot, report. All monies are handed direct to the chief clerk, who does the actual checking of the money received against the receipts given. Customers' receipt books are all on the carbon duplicate system. Two sets are kept going; one set out and one set in, on alternate days. This method affords every opportunity for efficient checking, as the practice is to enter up the collectors' and the office receipts into the receipts voucher book the day after giving out the receipts, at the same time carefully checking the amounts and totals. From the receipt voucher book the rental clerk takes his figures for posting to the credit of consumers in his rental. In no case do the collectors have access to the receipt voucher book or rental. The slot money receipt books are checked the following day against the slot cards to see that they agree; the cash in each case being checked against the recorded gas consumptions as shown on the card. Residual cash sales are made by ticket. The face value of these is checked against the cash handed in by the weigh clerk; the next ticket on the roll being initialled every evening by the senior clerk.

Accounting Department.

This is under the charge of the chief clerk, who personally deals with the more important books, such as nominal ledger, personal ledger, expenditure journal, cash-book, &c. The method of dealing with moneys for the bank is perhaps worth mentioning. The daily totals of the cash takings of the ordinary collectors, slot collectors, show-rooms, office, coke office, &c., are, after being carefully checked against the receipt books, posted by the chief clerk into a book called the rough cash book—each total being put in its respective column. The total of these is brought forward into the actual banking column. This book, along with the paying-in bank slip, and the cheques for signature, are brought before the manager each morning, which gives him an opportunity of noting the totals of the monies received, and also of comparing the total of these against the banking slip; so that he is quite sure of the money being actually banked. The bank pass books are sent to the bank each Friday morning for entering up, and are received on Saturday by the manager, who thus has a further opportunity of checking the amounts actually banked day by day.

Correspondence Department.

The manager deals personally with all correspondence, allocating the incoming mail to the different departments, such as complaints, collections, sales, or accounts, and hands these to the different staff members in charge of these sections, with definite verbal instructions as to what is required. All reports back to the manager upon any matter raised in this correspondence has to be confirmed in writing; small carbon duplicate books being used by staff members for this purpose. From these reports, the manager is able to dictate his replies with confidence, as subordinates will generally make sure of any matter being correct before attaching their signature to them. All letters sent out are typed, and a duplicate copy retained for filing; the filing being done in cabinets fitted with vertical divisions.

Manufacturing Records Department.

The manager is in charge of this department; but the books and the work of analyzing out costs of production, &c., is carried out partly by the assistant and partly by the chief clerk. Daily records are made of the gas produced, settings in use, &c., and weekly records are got out giving the actual make of gas per ton, average make per man, make of tar, sulphate, &c., per ton, and the gross and net costs of production. Here, again, all reports bearing upon working costs, chemical tests, condition of works, &c., are made out on carbon duplicate books, so that each subordinate has a complete record of the reports he has handed to the manager.

This, in general, is the system brought about at Neath, after considerable planning and forethought, and is certainly enabling the work to be carried on in a very smooth manner. There are many other matters that could have been mentioned—details of many of the account books, method of filing correspondence, modern card methods of dealing with work, &c.—but I trust that the little bit of ground I have been able to go over will open-out a discussion which may be beneficial to every one of us.

DISCUSSION.

Mr. T. H. Hazell (Newport) said Mr. Jackson had given them a thoroughly satisfactory explanation of all the systems to which he had referred. As to methods of collecting and dealing with the coppers from prepayment meters, there were all sorts of ways one knew of that had been resorted to for gathering in the money and passing it finally on to the bank. One remembered seeing in the Technical Press an advertisement of a machine for counting and packing these coppers; but he thought this was now pretty well obsolete. The human fingers were much more nimble and much more accurate; and the result of the human way of doing it was altogether more satisfactory. No doubt the Newport system was the general one adopted at the present time. They sent out a cart for the purpose of meeting the men who were emptying the meters in a certain district. After these men had got as much as they found they could carry, they went to an agreed centre, where the cart was waiting, relieved themselves of the money, and went back to finish the district. There was a junior with the responsible man. One counted the money, while the other looked at the meter; and they saw that the two corresponded. Then they entered the quantity of gas consumed and the amount of money collected on cards provided; and on the spot they filled up the 5s. paper bags. These were then placed in one pound bags; and when as many as five were got together they were placed in canvas bags. In this way, they were brought into the office; and at the office the clerk in charge for dealing with this money went through every separate card, checked the total, and the money was left over for banking every two days. They paid into the bank about 25 tons of coppers every quarter. This took a lot of dealing with; and they found they could not let the money go longer than two days at a time without paying it in. Luckily they secured it before the war commenced, or they would not have been able to get hold of an adding machine. This was a most admirable way of saving labour. They just put the number of the account, the quantity of gas consumed, the amount of money, and so on, all typed from the machine; and when the bottom of the foolscap sheet was reached, one merely pulled a lever and the total was shown. This total was carried forward until the end of the day's work was reached, when the gross total appeared. The sheet was then filed away. The matter of filing was very important. One of the chief difficulties they had had to deal with was the immense accumulation of papers of all sorts and sizes. It was hard to keep them all distinct, and to know from a single word just where to look to get the paper that might be required at the time. There was no way of doing this but by filing; and it was very desirable that a good system of filing should be adopted in every case.

Mr. J. E. Kenshole (Merthyr Tydfil) thought the subject dealt with in the paper was one which in many instances had not had quite the amount of attention that it deserved. No doubt in offices there was frequently a lot of useless labour. Not only was it useless, but it appeared to him that the more entries there were made on any particular subject the more chances were there of errors creeping in. He gathered that the author was eliminating all that was possible, and worked upon original entries. He himself adopted this method some time go. But he was rather surprised to hear Mr. Jackson mention the voucher folio. This was a system they at one time had in operation at Merthyr; but they found there was too great a chance of errors creeping in, with items originally entered in the receipt-book, and from the voucher into the rental. They therefore did away with the voucher book, and took the original entry from the receipt book, and posted directly into the rental—folioing the counterfoil of the receipt in the receipt-book.

Mr. F. Shewring (Pontardawe) said that some few years ago he commenced a card system for keeping a record of the services and mains on the district, and also the syphons, &c. He was only able to put the idea into practice a short time before leaving the place. He had a card for each house where they had a service, showing when the service was laid, what type of service it was, the depth of the main, the distance of the main from the curb, the side of the street, and other particulars. Such a system had to be built-up gradually, because the necessary records were not always available. In the planning of mains on a map, the size was so small that one could give very little detail; and the card system was an excellent way of keeping in touch with the distribution department. He thought when considering any matter of this kind it was advisable to get in touch with specialists. Systems could then be adapted to meet particular needs. Another method had come to his notice a few years ago of dealing with personal matters that a manager had to attend to himself. It was known as the "brain-box," and was so arranged that by its aid, without having a diary, the manager would daily have before him any matter that had to be dealt with. Those who adopted this system would find it very helpful.

Mr. J. Mogford (Briton Ferry) said that the system outlined by the author would be of more use to a large concern than it would be to a small one; and the majority of the members were connected with very small undertakings. His own works was a small one; and so he had not a very big staff. He therefore had to cut the work down as far as possible, and avoid any redundancy. They had a carbon duplicate system; and it had to fit in with the requirements of the Local Government Board—the final arbiter in the matter being the District Auditor. The system was laid down; and they had to keep pretty closely to it. The slot collections in his district comprised practically all the office work; the great majority of the consumers having prepayment meters. The system they adopted was somewhat similar to that which had been described by Mr. Hazell; but he employed the "obsolete" machine to which that gentleman had referred, and found it very useful indeed. They sent out two men—a responsible man and a junior. They worked together; and about the middle of the morning and the middle of the afternoon he sent another man to relieve them of the heavy coppers. They used a carbon duplicate receipt-book, in which they entered full particulars of the meter-readings; and they checked the money on the consumer's premises, and put it into one bag. Then it was brought back to the office, and he (the speaker) as a rule had to see that it agreed with the receipts. This he did with the coin-counting machine to which Mr. Hazell had alluded. He had had it in use for ten or twelve years; and, with a few repairs, it was now going as well as ever. The advantage of it was that it did away with the brain work. One threw the coppers on to the slide, and they ran into recesses. When the recesses were full, there was 5s. worth of coppers. It was absolutely accurate. The manager was usually the office staff, and had to attend to complaints and callers of all kinds, and at the same time carry on his work. The coppers were dropped from the machine into 5s. bags; and these were sent to the bank daily. They were simply thrown on to the floor of the bank; and the bank always accepted them. There was never a complaint of any inaccuracy at all. He did not know whether any other method would to a greater extent relieve the manager of a small works; but he had

found this system to work perfectly for a number of years, and to his mind it was the best where the staff was very limited.

Mr. J. ROBB (Chepstow) remarked that what was adaptable to one works was not adaptable to another; and as in his own case he was practically the complete staff, the system outlined by the author would not apply to him. He thought that possibly there might have been a little more notice taken of the sales department. This was where they ought to concentrate their energy. There was no use making an article, unless they could sell it. They must push their sales. There was often far too much money spent over office work; and the manager had very little control over this. But if they could simplify their methods and get a thoroughly good sales department for small undertakings, it would be very beneficial.

Mr. JACKSON, replying to the discussion, said that with regard to prepayment meters they had what he regarded as a very good system at Neath. They arranged, as was done at Newport, to send a boy out with a truck. This truck was locked; and the slot-collector had one key, while the other was kept in the office. The money was made up into 10s. bags, then put into £5 bags, and brought back to the office with the truck locked. It was then put into the safe until the slot-collectors returned. As to checking the money, he secured a weight which coincided with 10s. worth of coppers. Anything above this they passed immediately; anything slightly below the collector whose initials were on the bag had to check with the clerk who received it. Since adopting this plan, they had had no trouble with the bank and no trouble with the collectors. As to what Mr. Kenshole had said, his own feelings were much in favour of eliminating surplus books; but he was always afraid of the personal element. If they made the receipt-book the final book, and the man carrying it had an accident, and the book was lost, where would they be? This was why he liked to have a permanent record as well. The system which had been brought into operation at Neath was really fitted for a much larger works. In the case of smaller works, they could see whether it was not possible to make those who were employed do a little more executive work. He did not believe in the manager being up to his eyes in managerial work. He could not do the best for his undertaking in such circumstances.

A Gas Machine for Wrapping Bread.

According to "Gas Logic," the organ of the Consolidated Gas Company of New York, one of the largest bakeries in the city turns out sixty loaves of bread, weighing 1½ lbs. each, every minute, or 3600 in an hour. These loaves are wrapped in germ-proof waxed paper, sealed both ends, and uncovered only by tearing the paper. This wrapping and sealing of the bread is the work of a new gas machine. Before its invention, a small hand device was used, the capacity of which, if worked at top speed, was limited to six loaves of bread a minute, or one-tenth that of the modern gas-machine. The hand device required the labour of girls to wrap the loaves before they were fed to it to be sealed, The gas-machine needs one man to feed the bread, and another to pack it as it comes out, wrapped—one loaf every second—ready for the market. The operation of wrapping and sealing is performed by an automatic feeder, which carries the bread down a slide over a roll of waxed paper fastened under the machine; a gas hot-plate which seals the ends of the loaf by melting the wax from the paper; and a reverse-moving belt which cools the heated ends as the loaf passes on down the shoot after going over the hot-plate. The man who feeds the bread, first lights the gas under the hot-plate, and then sets his machine in action. He passes the loaves down the slide, whence they are automatically conveyed over the wax-paper. The paper used for the wrapping is waxed before it reaches the bakery by a process involving the use of gas.

Location of Gas Plants.

Mr. L. W. Alwyn-Schmidt, writing in the "American Gas Engineering Journal," points out that the local effectiveness and financial prosperity of a gas enterprise are decided practically entirely by its location. Owing to the peculiar character of gas, the transmission of the service plays a large part in its effective execution. This is why location is so important a factor in the the life of gas plant. The mains represent a considerable part of the investment in the enterprise; but the length of the pipe-line has little to do as a rule with the charge for gas. This is regulated by the application of a flat-rate, which is the same for the consumer at a hundred yard distance from the generating plant as for the one living a thousand yards away. While this may be correct in principle for such public utilities as gas and electric light, it remains, he says, nevertheless faulty commercially. It overcharges the consumer in near proximity to the manufacturing plant, in favour of the one at the other end of the distribution line. It can hardly be corrected, though it is the cause of much of the financial trouble of many gas companies in America. There are two methods by which one can attack the problem of a gas undertaking whose consumption has developed away from the gas-works. One is to raise the price of gas so as to compensate for higher distribution costs; and the second is to remove the manufacturing plant to a more suitable spot near the principal new distribution centre. The first step has been tried, sometimes with disastrous results to the prosperity of the gas company; and under present financial conditions, the second solution seems to be equally impossible to carry into effect. Nevertheless, this matter of relocation will, he thinks, in the very near future become an urgent necessity in the case of many gas plants in America; and it has to be considered therefore in its economic aspects.

THE LINACRE WORKS OF THE LIVERPOOL GAS COMPANY.

Constructional Details.

In connection with the visit—reported in the "JOURNAL" for Sept. 9, p. 560—of the members of the Manchester and District Junior Gas Association to the Linacre works of the Liverpool Gas Company, the following particulars as to the plant inspected will be of interest.

LINACRE WORKS.

The Linacre works of the Liverpool Gas Company cover an area of 23 acres, and consist of three coal-gas plants—the North works, South-East works, and Experimental works—also an oil-gas plant. The total capacities are: North works, 4,800,000 c.ft. per day; South-East works, 8,000,000 c.ft. per day; the Experimental works, 160,000 c.ft. per day; and the oil-gas plant, 9,000,000 c.ft. per day. This gives an approximate total capacity of 22,000,000 c.ft. per day.

The facilities for receiving and discharging coal are: A railway and canal at the North works, and a canal at the South-East works. Stock can, however, be moved from point to point by motor or cart along the works streets. The railway is a branch, at high level, of the Midland Railway Company's line to the Alexandra Dock. Coal is received in bottom-door wagons, and discharged either into shoots leading to the coal breakers, or to carts or motors, as may be desired. On the canal which bounds the works on the east and south sides barges are discharged by travelling jib cranes, all steam driven, with 15 cwt. Priestman single-chain grabs. Three of these cranes run on an elevated craneway at the South-East works; a fourth is a portable crane, mounted on rails; while a fifth is fixed on a pier at the North works. Each crane is capable of handling 16 tons per hour, and discharges into auto-weighers over crushers, through which the coal passes, and whence it is elevated to the hoppers.

At the North works there are three retort-houses, set parallel to the canal. The first house consists of twelve beds of eight through retorts, ⊏ section, 24 in. by 18 in. by 22 ft. long; each retort having two 7 in. ascension pipes connected to hydraulic mains of ample section. The maximum charge is 18 cwt.; the duration of charge twelve hours; the men working in two eight-hour shifts. The second, or middle house, contains twelve beds of six through retorts, ⊏ section, 22 in. by 16 in. by 18 ft. long; each retort having one 8 in. ascension-pipe. The charge is 12 cwt. for twelve hours; two shifts of eight hours being worked as before, but at times which do not coincide with those of the first house. The third setting is at present being reconstructed, and will be substantially the same as the first. All the retorts are heated by regenerative furnaces at one side, with the main flue under the centre of the bench.

The settings in the first and third houses are charged by Fiddes-Aldridge electric machines, fed from continuous overhead hoppers; and the coke is discharged into De Brouwer hot-coke conveyers, which deliver it under water sprays, to end hoppers, from which it is drawn into bottom-opening trucks on a light railway. Thence it is led to the oil-gas works' bunkers by means of a travelling steam jig-crane with tipping gear, or, alternatively in the case of the third house, to self-tipping skips of a Temperley transporter, from which it goes either into the oil-gas plant bunkers, to the coke wagons, or to stock—according to requirements. The retorts in the second or middle house are charged by means of Arrol-Foulis hydraulic stoking machines, taking 5 tons of coal at a time from fixed hoppers at one end of the retort-house. The coke is discharged by a Williams and M'Phee's discharger into self-tipping skips, which are wheeled under sprinklers for quenching; and it is then disposed of by the Temperley transporter.

The experimental works is used for testing 100-ton lots of coal. It has four beds of six single retorts, ⊏ section, 22 in. by 16 in. by 10 ft. long, hand charged; and, when testing, the make of gas goes through separate condensers, exhauster, tower scrubbers, washers, purifiers, meter, &c., to the test holder; so that all data necessary regarding tar, ammonia, calorific value, &c., are obtained. But ordinarily the gas joins the main stream of the North works gas and passes through six sets of atmospheric pipe-condensers, two "Cyclone" tar extractors, and six tower scrubbers in two series of three.

Three of Bryan Donkin's 200,000 c.ft. per hour exhausters—two-bladed, steam-driven, and one of which is a spare—are used to propel the gas through two Standard rotary washer-scrubbers, to two sets of purifiers, charged with oxide. There is one set of four purifiers, water-luted, having hydraulic valves (and each box measuring 50 ft. by 30 ft. by 5 ft. 6 in.) elevated and housed; while the other set of four is built outside—the boxes measuring 46 ft. by 32 ft. 6 in. by 5 ft. 6 in. each, constructed without lutes, and fitted with Weck's centre-valve on 30-in. connections.

After leaving the purifiers, the gas passes through four wet station meters in parallel; two meters being of 65,000 c.ft. and two of 50,000 c.ft. per hour capacity, to a 42 in. mixing main leading to the inlet of the gasholders.

The South-East works contains two retort-houses, Nos. 1 and 2. There are sixteen beds of eight Glover-West continuous vertical retorts, in two sections of eight beds each in No. 1 house. The coke from these retorts is removed in self-tipping skips by

telpher, and is discharged either into screens and hoppers, or else to stock in the yard. The installation is designed to carbonize 400 tons of coal per day. No. 2 house contains twenty-nine beds of six horizontal ⌂ section retorts, 23 in. by 16 in. by 20 ft. long, with one 8-in. ascension pipe to each retort. The charges are 10 cwt., and the duration eight hours; the men working three eight-hour shifts. The beds are arranged in four benches of eight, eight, five, and eight beds respectively; the hydraulic main on the first, second, and fourth benches being in two sections. These retorts are charged by Fiddes-Aldridge machines; the coke being received into self-tipping skips, and removed by telpher to quenching tanks—thence to crusher, screens, and bunkers, or else direct to the heap in the yard.

The coal to No. 1 retort-house is received from a grab over an auto-weigher into either one (or both) of two coal breakers of 30 tons per hour capacity, driven by a 27 H.P. gas-engine or by one of 35 H.P. recently added.

Gravity bucket conveyors deliver the coal into bunkers over the retorts along the top of the house; the capacity of the whole length of bunkers being 600 tons.

The coal-breaker at No. 2 retort-house has a capacity of 40 tons per hour, and is driven by an electric motor of 20 B.H.P. The coal is raised by an 18-in. bucket elevator and passed along by a 24-in. push-plate conveyor, extending up to the middle of the house, and fitted with sliding doors for distributing the coal in the bunkers. A Babcock and Wilcox tray conveyor takes the coal from the end of the push-plate conveyor and feeds the second half of the house—suitable tipping gear being mounted to deposit the coal where required. These bunkers are continuous, and have a capacity of 500 tons. Each bench of retorts in the South-East works has its retort-house governor; so that a good working pull of about 3 in. at the exhauster can be maintained. Each section is balanced separately.

The gas from the South-East works, after passing through two water-cooled condensers, is drawn through eight sets of atmospheric condensers by three of Allen's two-bladed, steam-driven exhausters—one having a capacity of 160,000 c.ft. and two of 110,000 c.ft. per hour; thence to three Livesey washers and three rotary Standard washer-scrubbers—one of 3 million c.ft. and two of 2 millions capacity per day. These latter are generally used for cyanogen extraction by the Davis-Neill process; liquor containing sulphide of iron being circulated through them instead of passing in water in the usual way. Finally two Standard centrifugal washers are used to remove the remaining ammonia; and the gas passes along a 30-in. main to the purifying system.

This consists of twelve elevated boxes, with connections above ground. Two sets of four water-lute purifiers (having hydraulic valves and boxes) of 36 ft. by 23 ft. by 6 ft. 3 in. are housed; the other set of four being outside, with slated roof. Each box measures 46 ft. by 32 ft. 6 in. by 5 ft. 6 in. The outside purifiers are luteless, and have Weck's valves on a 30 in. main. All the purifiers are charged with oxide of iron; hurdle grids being in use. The gas passes downwards. Two catch boxes, 39 ft. by 25 ft. by 6 ft. 3 in., having water lutes and being charged with oxide, are set on the ground outside.

The gas is measured by three meters—two 125,000 c.ft. wet meters and one Thorp's "Rotary" 100,000 c.ft. per hour meter. The latter is in the open, on its way to the 42 in. mixing-main before mentioned.

There is storage accommodation about the works for about 50,000 tons of coal and 20,000 tons of coke and breeze.

The oil-gas plant comprises nine sets of Humphreys and Glasgow's double superheater plant, having a total capacity of about 12 million c.ft. of carburetted gas of 16 c.p. But working blue reduces this by about 30 p.ct.; so that 9 millions per day is about the quantity under present conditions, when oil is only used on one or two sets. The old house includes four sets with 9 ft. 6 in. generators and two sets with 8 ft. 6 in. generators—one of the latter being fitted with an auto-cleaning roller grate. The new house has three sets with 9 ft. 6 in. generators fitted with roller grates, which are operated by hydraulic motors. In these sections, the scrubber has been dispensed with. The steam pressure is 110 lbs. per sq. in.; the blast pressure, 18 in.; the cycle six minutes run and three minutes blow; down runs, as required; clinkering, every four hours. A dust interceptor on each set between the generator and the carburettor prevents coke dust and ashes from entering the fixing chambers; while safety interlocking gear, air-blast, steam meters, and electrical pyrometers are also fitted. The coke, as received in the hoppers at the end of each house—either from the light railway coke cranes or the transporter—is charged by means of bogies into the generators in quantities of 6 to 10 cwt. The necessary steam is supplied by nine Babcock and Wilcox water-tube boilers, each of about 1827 sq. ft. of heating surface.

The blast is from two No. 10 Sturtevant blowers, belt-driven from Bellis and Morcom's high-speed engines. The two houses can be separated when on winter load; and a 55 H.P. turbine-driven fan used for the new section, in order to avoid loss of pressure through too many sets blowing at once. Nine primary water-tube condensers easily reduce the temperature of the gas made to about 95° Fahr., after which, six sets of air-condensers lower it to atmospheric, or 55° in winter, at which temperature the gas is passed through two filter boxes, each 10 ft. square and 5 ft. deep, loaded with graded clinker, first coarse in the bottom, then finer at the top.

The relief holder has a capacity of about 70,000 c.ft., and the oil-storage tanks, into which oil can be received either by rail or barge, have a capacity of 4700 tons. In the machinery house are the usual oil, tar, liquor, and boiler-feed pumps, with sunken settling tanks and overhead storage cisterns for tar and water close by.

Three pairs of Donkin exhausters—one pair 120,000 c.ft. (four-blade), one pair 100,000 c.ft. and one pair 80,000 c.ft. per hour each end, all steam driven—propel the gas to the purifiers, on the way to which it passes through a battery of three Pelouze and Audouin and one Carter's "Hurricane" tar extractors, where the last traces of the tar-fog are removed. There are eight purifiers in three sets, all elevated. Two sets of three are water-lute, with hydraulic valves, housed, with 30-in. mains. They measure each 52 ft. by 26 ft. by 5 ft. 6 in. The remaining set of two luteless boxes are 48 ft. by 34 ft. 6 in. by 5 ft. 6 in., served by a modification of the Weck's valve. These are in the open, except for the corrugated iron roof. Oxide only is used for oil-gas purification; and it is all sold (when spent) without difficulty. The gas is measured in a station meter of a capacity of 175,000 c.ft. per hour, and a "Thomas" electric meter, installed by Messrs. Humphreys and Glasgow.

The latter meter, although having a capacity of 600,000 c.ft. per hour, is scarcely larger than the 24-in. main into which it is inserted. Gas is heated, through a fixed and constant range, by means of an electric heater in passing. If the specific heat of the gas is constant, the quantity of heat (and therefore power) thus introduced is a measure of the gas flow. This energy is measured by a watt-meter, calibrated to read directly in cubic feet instead of electric units. The means of regulating the temperature difference is by using two electrical thermometers, one before and one after the heating, each connected to a delicate galvanometer. The needle of this is in balance when the thermometers are of equal resistance; the second being (say) 2° Fahr. warmer than the first. Any tendency for the temperature to change, owing to variation in the gas flow, upsets the balance, and the deflection of the galvanometer needle is utilized to operate a rheostat regulating the current supplied to the heater. A small motor, about ⅛ H.P., supplies movement and generates low-pressure current (about 50 volts) in the dynamo for the heater, so that by an arrangement of gearing with pawls operated by magnets energized more or less according to the position of the galvanometer needles, the rheostat is regulated automatically.

The stream of oil gas now enters the 42 in. mixing main, from which the combined stream of mixed gas, representing the works total make, can be distributed as desired between the two sets of gasholders—Nos. 1 and 2, or Nos. 5, 6, 7, and 8. The storage holders, eight in all, have a combined capacity of 9 million c.ft. of gas, some proportion of which is delivered directly through balanced-governors to the six main districts at the north end of Liverpool—including Bootle, Walton, Seaforth, and Waterloo. The remainder is pumped to the Athol Street and Eccles Street works, and (when required) through Athol Street to Garston, for aiding the south-end through a high-pressure trunk or messenger main, by means of four pairs of Gwynne-Beale exhausters, two bladed, of 63,000 c.ft. per hour capacity. Normally, the engines are made to pump gas into a weighted holder (No. 3), throwing 10 in. back-pressure, which is in communication with the messenger main from which the town works takes supplies. But if there is a shortage in the town, or during the maximum pressures period in winter, the gasholder is shut off and higher pressures up to 24 in. or more are used. No. 4 holder is the test holder, but is also available for storage and delivery.

The electric power for the operation of the various plants is direct-current of 220 volts, and is generated on the works. The power house contains three dynamos of 40½ KW. capacity, direct-coupled by flexible couplings to three 60 B.H.P. gas-engines and two dynamos of 52·8 KW. coupled to two 80 B.H.P. engines. Nearly forty electric motors (20 B.H.P. down to ⅛ B.H.P.) are in use.

A complete plant for the extraction of benzol and toluol and their recovery was installed during the early stages of the war for treating the North works coal gas; but it is not now in operation. The most recent developments at Linacre include the erection of a Simon-Carvès sulphate of ammonia plant, capable of dealing with the whole of the ammoniacal liquor produced by the Company, and of making 25 tons of salt per day, with three Taylor saturators.

One of Yeadon's briquetting machines was erected during the war, to deal with coke breeze and pitch. It has a capacity of 3 tons an hour. The machine has undoubtedly assisted in getting over the difficulty presented by the double trouble of coke shortage and breeze surfeit from which the Company, in common with others, has suffered recently as a consequence of having to get along with inferior coals.

During the winter of 1913-14, it was evident that, owing to the increasing demand, district pressures could not be fully maintained by the weight of the holders only. Consequently, a Keith-Blackman turbo-booster of 27 B.H.P., 1200 revolutions per minute, 600,000 c.ft. per hour capacity at 10 in. was installed, delivering direct on to the governor inlet main, with automatic safety by-pass, &c.

Two "Simplex" vaporizers in the booster house and seven atomizer sprays in the various governor outlets and messenger main, are used with much success for the purpose of minimizing the trouble from naphthalene both on the works and on districts. The oil used at present is "War Kerosene No. 1."

The works include fairly-well equipped fitting shop, turning

shop, electric fitting shop, smithy with 15 cwt. steam hammer, joiners' shop, paint shop, stores, &c.; and in the laboratory, besides the usual testing apparatus, is a Simmance recording total-heat calorimeter, and in the governor house adjoining is a "Sarco" recorder.

HIRD'S CONTINUOUS TAR PLANT.

By S. Stonier.

[A Paper read before the Western Section of the Coke-Oven Managers' Association].

The first experimental system of this type was built at the Talk-o'th'Hill Colliery Coke-Ovens. For twenty years previous to this plant being installed, tar was distilled at the works with the ordinary intermittent type of still; so that we might claim to be experienced tar distillers. To successfully distil tar continuously was looked upon until quite recently as a risky experiment; there having been serious failures with several different types of continuous tar plant.

We kept our intermittent plant in order as a stand-by in case the Hird plant should be a failure. We did not have to use it; but nevertheless the old plant was kept intact for three years from the time of first putting in the Hird plant; and at the end of that period we had no hesitation in completely pulling down the old plant—having proved that we were absolutely on better lines by the working of the newer and more up-to-date process. For the first two years a large amount of alterations and experimental work was done; and the original was materially modified before either ourselves or the patentees were satisfied with it.

The plants now being erected are naturally a big improvement on the plant we have at Talk. This, of course, is to be expected, as experience is gained, as in the usual development of all new processes. The plant at Talk consists of four mild-steel stills or units. Each still is supplied with two manholes, swan-neck and vapour pipe, thermometer, and safety valve. The distillates from Nos. 1 and 2 stills, also those from the three preheaters, are all collected in one receiving box, and so on to the receiver. There are also the receivers for the creosote and anthracene oil. Internally, baffle-plates are fitted lengthwise in the stills, so as to cause the tar to flow circuitously from inlet to outlet.

The fourth still is fitted with four plates across the width, and steam is introduced in each of the four compartments thus made. Nos. 1, 2, and 3 stills are fitted with three longitudinal heating tubes apiece, with flanges so as to permit of them being drawn up to the still by bolts—using asbestos millboard as the jointing material. At the burner end, the jointing is introduced between the flange and the still (on the outside of the stills); at the back, the packing is on the inside. This arrangement has always been a source of trouble and expense. Six months ago we put in a No. 2 unit; and this still was fitted with expanded tubes. After six months' work, there is every evidence of the advantage of expanded tubes—the risk of leakage or fire being *nil*. No labour or material is required in making the very difficult joints, as in the old type.

There was one apparent drawback with the expanded tubes—they could not be withdrawn to properly clean the still. In our case, there is a fair amount of residue left in the still. The first time of cleaning the still with the expanded tubes, we ran a considerable amount of pitchy matter from the still while it was hot, but not all of it; and this meant awkward cleaning. So the next time the stills were off, we ran off all the pitchy residue that we could, and then turned in steam through a flexible hose. This plan works very well—thoroughly clearing the still, and doing away with the cleaners going into the stills to clean or chip them.

In the modern plant all the stills are fitted with expanded tubes; and I feel sure the system of steaming we have adopted is important in cleaning. Each gas-tube is 5½ in. diameter, and fitted with a bunsen burner. No. 4 still is fitted with four open steam-pipes and no gas-tubes. No. 1 still has an inlet for the heated raw tar, and an outlet for the partially distilled tar connected to No. 2 still. No. 3 still is likewise connected to No. 2 outlet. No. 4 still (the outlet of which is provided with a 15-in. seal of 6 in. diameter) is connected to the pitch cooler. This is fitted inside with a baffle-plate, so arranged that the pitch will flow along one side and then down the other. There is a cast-iron coil inside the cooler, through which passes the hot tar from the heaters, previous to entering No. 1 still. This gives a further heat-exchange, bringing the tar up to practically boiling point.

There are three heaters, consisting of wrought-iron circular tanks, each provided with an inlet about one-third of the height from the top, and an outlet through which the tar is conducted prior to being delivered to the stills. Each heater is fitted inside with a cast-iron coil connected at the top to the vapour pipe from the still, and at the bottom to the top of the coil of the water condenser. The light product vapours from these heaters are collected in a common main and auxiliary condenser.

The general condensing arrangements at Talk are not very satisfactory; and in the more recent plants it has been greatly improved. The amount of water required on the modern plant for condensing, per ton of tar distilled, does not exceed 30 gallons, which is quite normal. Our present arrangement is as originally fitted. It consists of two tanks fitted with baffle-plates serving for the condensation of five separate distillates. There are three sight-boxes provided with outlets for the various distillates, and a second outlet for the foul gas, connected to an oxide purifier.

The back-ends of the heating tubes (of the stills) are connected into a waste-heat flue which passes underneath the fourth still. The tar is fairly free from water, usually containing about 5 p.ct. It is then pumped into a heater, fitted with a dry-steam coil. The tar leaves this at 50° C., and enters a regulating tank; a constant head of tar being maintained by means of a float-valve in the regulating tank. The tar is then led to the first of the three heaters; the tar being controlled by means of a check valve. Passing through these heaters, the temperature is still further raised to 110° C. It now passes through the pitch cooler, the temperature being raised to 125° C.; thence through a 3 in. main behind the stills above the waste-heat flue; and finally it enters the still at 135° C.

When we did not heat the tar sufficiently previous to entering the stills, we could only average 20 cwt. of tar distilled per hour. Now we are obtaining for a period of five weeks 25 cwt. per hour of tar distilled, while the plant was put in for only 20 cwt. We distil 800 tons of tar in four weeks, and this gives the plant three weeks to stand.

The temperature in No. 1 still is 190° C.; and in No. 2 still 240° C. The two distillates are mixed together, and the average specific gravity is 1·030. The creosote oil distillate averages 1·060 sp. gr., and is distilled off No. 3 still at 320° to 330° C.

The temperature becomes reduced in No. 4 still to about 275° C.—being due to the steam which is used in this still. [I may mention here that the No. 4 still only requires cleaning about every twelve months.] The pitch enters the beds at about 140° C.; and there is absolutely no nuisance from pitch fumes. In our case, we have thermometers fitted to the stills. The modern plants are provided with electric thermocouple pyrometers, either indicating or recording on a chart the temperature of each still. This serves as a valuable check on the men in charge.

The depth of tar in the still is 16 in., being 3 or 4 in. over the top of the heating tubes. This is a very important point, because an increased depth of tar over the tubes means extra heat required for distilling, or else a reduced output from the plant.

The total weight of tar in a 20-ton per day plant is 7½ tons. There are 3 tons in the stills, 1½ tons in the pitch cooler, and 3 tons in the heaters. The gas used amounts to 2000 to 2500 c.ft. per hour, and distilling 25 cwt. per hour equals 1500 to 1875 c.ft. per ton. This is coke-oven gas measured through a meter, and of a value of 400 to 450 B.Th.U.

The plant undoubtedly works much better when gas-fired. As we can distil 800 tons in four weeks, and only 60 p.ct. of one man's time is taken up attending to the plant, the cost of this attendance working out at 1s. per ton. The gas costs, at 1s. 6d. per 1000 c.ft., 2s. 3d. to 2s. 6d. per ton of tar distilled. The cleaning costs 2d. per ton.

The adoption of breeze for distilling the tar is a success. Good gas-works breeze figures range from 1·6 to 3 cwt. per ton of tar. Breeze sweepings containing only 40 to 50 p.ct. of combustible matter is as high as 4 to 5 cwt.; and attendance costs are in proportion. At a coking plant where gas is available, it is undoubtedly the best practice to gas-fire the stills; but where gas cannot be obtained, or where the cost is very high, then a breeze furnace can be adopted with success.

Repairs to plant have in our experience been very light. No. 1 still has been working for seven years, and no repairs yet required. Nos. 2 and 3 stills have had two back-end plates renewed; and No. 4 still has been fitted with a new bottom.

Actually, there has been 30,000 tons of tar distilled by the present plant. The life of the tubes in No. 1 still is eighteen months; No. 2 still, fifteen months; and No. 3 still, twelve months. These figures refer to the old type of tube; but the indications are that the expanded tubes will have a much longer life. The tubes become corroded fairly uniformly, until the thickness is reduced to about ¼ in., when pitting takes place. The leakage is a very small one, and gives ample warning of the condition of the tube.

The degree of flexibility of the plant is very important. The following are the average fractions of twelve months' distilling: Nos. 1 and 2 stills equal 5° Tw.; No. 3 still, 10° Tw.; No. 4 still, 21° Tw. The plant will go for a complete run with only a very small difference in the distillates obtained; and the attendant has practically no alteration to make.

To have superheated steam for the last still is an advantage. I understand that where only low-pressure steam is available, the last still is fitted with tubes which may be fired with gas or an additional flue from the furnace firing the third still.

When starting-up the plant, each still is charged with tar, and firing is commenced. When the temperature of No. 1 still has reached about 150° C., the tar is allowed to flow slowly through the plant, and a small amount of steam is introduced into No. 4 unit. The plant is then gradually worked-up to the required distillate. If for any reason the plant has to be closed down temporarily, no leakage will occur with the expanded tubes; and a stoppage may be made for twelve hours. After that time, there is a tendency for the branches between the stills to pitch-up. To close-down for more than twenty-four hours it is preferable to complete the pitching of the fourth still and then run it and the pitch cooler empty.

Inefficient combustion has a great influence on the output. Burners should have very careful attention; and, when properly adjusted, they will go for a long time without alterations. Ex-

cessive chloride in the tar has a marked effect on the life of the plant, but less than in the case of pot-stills. The type of still now being made, to a very large extent, minimizes the effect of the chloride.

An up-to-date plant to distil 20 tons per day consists of the following apparatus: Three stills of cast iron, 9 ft. long, by 3 ft. wide by 3 ft. 6 in. deep, through which the tar passes in series. Stills Nos. 1 and 2 each contain three 6 in. internal diameter steel boiler-tubes, ¼ in. thick, expanded into ¾ in. steel end-plates, which are bolted to the flanges of the cast-iron casting. These tubes form only the medium by which the heat is transmitted to the tar. It is made to flow along the outside surface of the tubes by means of the baffle-plates. The tubes may be heated direct by means of burners, if a supply of coal gas or producer gas is available, or by a coke-breeze furnace. Still No. 3 is heated by the hot gases from Nos. 1 and 2 stills, which are passed through a flue beneath it, and thence to the chimney. A small quantity of steam is blown through the still by means of perforated pipes. There is a pitch cooler of the same dimensions as the still, which also acts as a heat-exchanger—being fitted with tubes (similar to Nos. 1 and 2 stills) through which the raw tar passes. The products of distillation leaving the three stills are passed through heaters, 3 ft. in diameter and 6 ft. deep, through which the crude tar is passed in series before going to the pitch cooler. The heat from the vapours in the coils drives off the water and naphtha from the incoming tar, and they are collected from the top of the heaters through a separate coil, and condensed.

The plant produces simultaneously four fractions of distillates, the character of which may be varied at will by varying the temperature of the stills. Each still has a heater and sight overflow—producing naphtha from the heaters, light oil from No. 1 still, creosote from No. 2 still, and anthracene from No. 3 still.

In addition to the above, the following plant is necessary: (1) Naphthalene separators. The distillates leaving Nos. 1 and 2 stills both contain naphthalene, and should therefore be cooled and separated from the crystallized naphthalene before storing. For this purpose four ⊔ section pans, about 7 ft. wide by 3 ft. 6 in. deep by 22 ft. long, of 2500 gallons capacity, should be provided. (2) Storage tanks. The extent of storage provided depends on the means available for the disposal of the products. There should be at least one receiving tank for each of the four products, capable of holding the equivalent of two railway tank wagons.

Comparisons of the Continuous Plant with the Intermittent or Semi-Intermittent Pot-Stills.

[Capacity of 20 tons of tar per day.]

To compare in completeness with the above plant, any plant of the pot-still type must consist of the following:

(1) Primary still (containing coil) at least 8 ft. diameter and 8 ft. high.
(2) A tar still, 9 or 10 ft. in diameter by 10 ft. high, with brick setting and grates.
(3) A pitch cooler, partly brick-lined, of sufficient size to hold a full charge from the stills.
(4) One or two condensing coils in a casing, for condensing the distillates.

The chief drawbacks which have been overcome by continued tar distillation are:

(1) The fuel consumption is reduced to half.
(2) The efficiency of the plant is dependent on the operator. Considerable experience is necessary to work a pot still to get a consistent result and to avoid loss. The continuous still is as easily controlled as a steam-boiler, and may be left in charge of an intelligent labourer.
(3) Cost of up-keep. Even with experienced handling, the pot still is always liable to injury from overheating or corrosion by ammonia and the salts contained in the tar. Cost of upkeep is often 20 p.ct. on the value of the plant annually.
(4) A pot still requires cleaning out thoroughly after not more than twelve runs, if over-heating is to be avoided. [= 12 × 20 = 240 tons.] The continuous still will work for at least thirty consecutive days distilling 20 tons per day, without cleaning or attention. [= 30 × 20 = 600 tons.]
(5) The continuous still has considerable advantage over the pot still in flexibility; and by varying the temperature, and observing the Twaddel of the distillates at the overflows, the products may be adjusted to any desired specification, and either dehydrated tar or hard or soft pitch may be produced.

If preferred, the continuous plant may be housed in a building, but if built in the open, no nuisance is caused from waste gases or fumes from the discharged pitch. The latter is unavoidable in the case of the pot-still plants.

DISCUSSION.

The Chairman (Mr. W. Surtees, of Apedale), on rising to open the discussion, said he would like some information as to the capital outlay on the intermittent and continuous plants. He agreed that the fuel costs should be lower in the case of the latter, but would be glad to know if this had been found to be so in practical working. He also wondered if any difficulty was experienced in obtaining clear-cut fractions. He thought he could foresee some trouble in obtaining proper fractionation when firing the continuous stills with breeze.

Mr. Stonier replied that there was not much difference in the first cost of the two systems. With respect to fuel cost, it was found that, if the depth of tar in the stills exceeded 27 in. over the top of the heating tubes, the fuel consumed was tremendously increased—often by 20 p.ct. On account of their special requirements at Talk-o'th'Hill, it suited them to take off fractions at 5° to 7° Twaddel and 10° to 11° Twaddel. When the naphthalene and carbolic had been taken out of these fractions, it left them with a very good quality of wash-oil for benzol extraction. To reduce as much as possible the trouble caused by corrosion, the makers had substituted cast iron for steel in the ends of the stills.

Mr. Shaw (Wigan) inquired if there had been any trouble through leakage from the expansion joints on the heating tubes.

Mr. Stonier said they had had no such leakage for six months together. Respecting the firing of the stills with breeze, he understood that no particular difficulty had been met with in keeping the fractions constant. The construction of the plant made regulation of the temperature easy.

Mr. Escott Wood (Brymbo) considered that the upkeep of the continuous type was not excessive, and had no doubt that in the later plants many improvements had been embodied which the earlier ones did not possess. To him, the weak point had always been the tubes, which showed a tendency to buckle. Probably this had now been surmounted. It was clear the author had had much less trouble at Talk-o'th'Hill than he (Mr. Wood) had had at Brymbo. The continuous plant they had installed had never succeeded in dealing with the specified quantity of tar. Considerable trouble was experienced when the tar contained much water. With 10 p.ct. of water passing to the plant in the tar, it was found that, as the tar reached the first still much frothing took place, which continued to the second and third stills. Pressure was thereby caused in the stills; and the tar was often blown out before it was distilled—frequently through the safety valves. There was consequently great danger from fire. When the tar contained so much water, it was found that a lot of naphthalene came over with the lighter distillation; and as this blocked-up the condenser tubes, steam inlets had had to be fixed at several parts of the plant.

Mr. Stonier remarked that, when the plant was working properly, there ought to be no water passing to the stills, as the pre-heaters should have already removed it. When the tar contained an excessive amount of water, they had had great trouble. There was no doubt that, to ensure comfortable working, the tar should be properly dehydrated before entering the stills. When using coke-oven gas, a pressure of 4 in. was necessary.

Mr. D. V. Hollingworth said there was something very fascinating in the idea of a continuously working plant of any kind; and whether or not the Hird system was the ideal one, the inventors deserved great credit for attacking the problem of continuous tar distillation in the way they had done. To his mind, the continuous tar plant should be as much like a calorimeter as possible—the whole of the thermal energy of the heating gas being given up to the tar, and as far as was practical the whole of the products leaving the system cold. If steam had to be added to the condensers, this was so much heat unnecessarily lost, and indicated some weakness in the plant. Any such discussion as the present naturally turned on a comparison of pot-stills with the continuous type; and this being so, they ought really to take into account initial outlay, running charges, area of ground occupied, fuel consumption, amount of wear and tear, freedom from danger of fire and explosion, quality of products, and suitability for any particular kind of tar. On considering how far each type would satisfy any particular set of requirements, it would be found, no doubt, that each possessed certain advantages over the other. Where perhaps a large quantity of tar had to be dealt with irrespective of clean fractionation, possibly the Hird plant would be best; but where distinct fractions were required, and the time taken was of secondary importance, the pot-stills were best. He had seen one or two recent installations of really up-to-date design; and they were of the pot-still type. The firms choosing these should be given credit for knowing what they were about. To him it seemed strange, if the continuous process possessed all the advantages which the author said it did, that such firms, being in possession of all the facts, had yet chosen the older type. He thought the case for pot-stills had not been quite fairly given. For example, the number of distillations possible with pot-stills before cleaning was required had been stated in the paper, as about twelve. He knew where, through force of circumstances, 65 distillations had been done through one still. It was all a question of steady working of the stills and correct furnace construction. No doubt, the good opinion which Mr. Stonier had of the process described was primarily due to his own care and good management of the plant having produced the excellent results stated.

Mr. Shadwell's Articles on Uses of Gas.

The latest particulars put forward by Mr. Gilbert C. Shadwell through the columns of the "American Gas Engineering Journal" in regard to the industrial use of gas, refer to the making of syrups, which has now become a very considerable trade. In consequence of the fact that in making them great care has to be exercised in the heat regulation, gas has become the one fuel which is sought after for the purpose. In an emergency, a standard cauldron furnace will do; but it is far better to have a special type of furnace, with a projecting edge not heated by the flame, and extending beyond the limits of the furnace jacket. Besides the necessity for the heat to be well regulated, it should be as little as possible—that is, the operation must not be unduly hurried. This is due to the fact that a solution of sugar, even when kept at 212° Fahr.—the temperature of boiling water—undergoes slow decomposition. The process of syrup making is a particularly simple one. As a rule, direct heat is employed, though a steam or water jacketed furnace is sometimes used. When great speed is needed, blast burners can be substiuted for atmospheric ones. It is also of use to fit legs to the furnace, to raise the height of the bib-cock outlet, and incidentally of the furnace. Variations from the standard type are required for certain syrups.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Beilby Report and the South Metropolitan Proposals.

SIR,—In reading your criticism, in the current number of the "JOURNAL," regarding my article published in the issue of Sept. 23, I notice you state that my apparent wish is for "the South Metropolitan Company to gratify their fancy for having restrictions put upon them by Act of Parliament." I do not think that this interpretation is justified by the wording of my article. I agree that my suggestion of a way out is weak; but we have to face the difficulty which has already been created. The South Metropolitan Company have intimated to their shareholders (on the printed balance-sheet and at their last general meeting) that they accept the Beilby report in full, and therefore the damage is done.

I do not flatter myself that any words of mine could have the slightest influence on the policy of the South Metropolitan Gas Company. They have probably carefully considered their position, and come to the definite conclusion before submitting this matter to their shareholders; and therefore I regard the precedent as being (for all practical purposes) established. I deplore their attitude as much as you do; and in writing that portion of my article I only endeavoured to make the best of what can only be regarded as a great set-back to the position of the industry generally.

In case my article may be regarded as too much inspired by the actions of the South Metropolitan Company, I should like to say that in fixing on a unit of 100,000 B.Th.U. I had not read that Dr. Carpenter had proposed the same unit himself. I arrived at the basis as a result of consideration of the six fundamental requirements referred to in my article.

ENGINEER.

Oct. 1, 1919.

[A parliamentary precedent is not established until it has been put into a Bill and the Bill has developed into an Act. The best way not to establish unnecessary precedents is to leave them out of Bills. The South Metropolitan Company can work to any degree of refinement they like without binding themselves to do so in an Act of Parliament.—ED. G.J.]

REGISTER OF PATENTS.

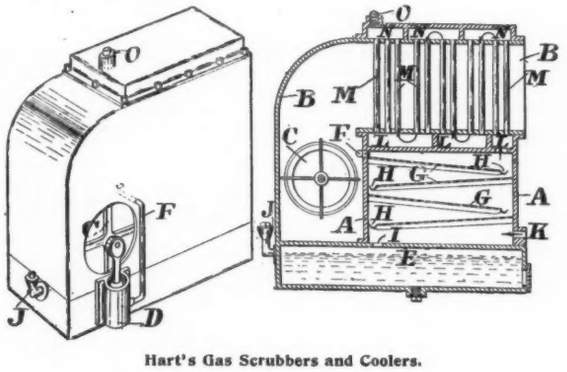
Gas Scrubbers and Coolers.—No. 118,848.

HART, W., of Haberfield, New South Wales.

No. 14,349; Sept. 4, 1918. Convention date, Aug. 28, 1917.

This invention relates to gas scrubbers and coolers of the kind wherein the gas passes in a zig-zag course through a series of tubes in an air passage and through a chamber, provided with a series of perforated plates fixed at a slight angle from opposite ends alternately.

A perspective view and a longitudinal sectional elevation are given of the scrubber and cooler.



Hart's Gas Scrubbers and Coolers.

The apparatus comprises a casing enclosing a chamber A and an air channel B, in which is a fan or blower C, preferably adapted also to operate a pump D to lift water from the tank E and deliver it by the pipe F to above the uppermost of a series of perforated inclined plates G alternately secured to opposite walls of the chamber A, and having a curved part or gutter H at their lower ends. The water passes partly through the perforations in the plates and partly down over the plates themselves to the gutters, from which it falls on to the next succeding plate, and finally passes, through the opening I, back into the tank E. J is a closable funnel for supplying water to the tank.

The gas from the generator enters the inlet K, and rising up through the perforations in, and round the ends of, the plates G, passes into the first of the passages L and flows through the first of the vertical tubes M, and then into the first of the passages N, then down through succeeding pipes M, and so on until it passes away in a cooled and purified condition through the pipe O. The gutters H retain any solid particles carried over in the gas from the generator; and they are ultimately conveyed into the tank E.

Removal of Sulphur and Sulphur Containing Bodies from Gases.—No. 130,654.

RIDEAL, E. K., of Victoria Street, S.W., and TAYLOR, H. S., of Golder's Green Road, N.W.

No. 3702; March 2, 1918.

It is well known, the patentees state, that when coal gas, producer gas, or other sulphur containing gases are passed over certain oxides—especially oxide of iron—maintained at a suitable temperature and in the presence of certain quantities of water vapour, reaction occurs in which all the sulphur compounds are converted into hydrogen sulphide. For example, carbon disulphide and water react to form carbon dioxide and hydrogen sulphide according to the equation: $CS_2 + 2H_2O = CO_2 + 2H_2S$.

This method has been utilized for the removal of sulphur compounds from gases; the hydrogen sulphide formed being fixed by the oxide employed (say, oxide of iron). But by reason of the fixing of the hydrogen sulphide by the oxide, any given quantity of oxide is able to treat only a very limited volume of gas, and the process can be carried out only intermittently by reason of the necessity for the more or less frequent renewing of the oxide.

It is also known that with oxide of iron heated to a temperature between 500° and 1000° C., the hydrogen sulphide formed is no longer fixed by the oxide, but passes on with the remainder of the gases. Thus the conversion of sulphur compounds to hydrogen sulphide may be carried on continuously; and with small amounts of oxide, very considerable volumes of gas may be treated. Such a method, however, is a "comparatively costly one to carry out, by reason of the high temperatures necessary; and, moreover, there is a great likelihood of the composition of the resultant gas, or its illuminating, calorific, or other qualities, becoming seriously varied or affected in such a manner as materially to lessen the value of the gas."

They have devised a comparatively cheap and simple process for the removal of sulphur without fixation by the catalyst and without any material alteration in the composition or ultimate quality of the gas, which consists in passing the gas, in admixture with a sufficient quantity of water vapour to prevent the reduction of the oxide employed, over heated iron oxide mixed with one or more of the oxides of chromium, nickel, cobalt, cerium, thorium, zirconium, manganese, or molybdenum, whereby the conversion of the sulphur compounds is selectively effected without simultaneous material change in the composition of the gas—such as the formation of carbon dioxide from any carbon monoxide which may be present in the gas.

In carrying the invention into effect, a catalytic material is employed which comprises oxide of iron admixed with a suitable proportion of one or more of the oxides of chromium, nickel, cobalt, cerium, thorium, zirconium, manganese, or molybdenum.

In one convenient example the catalytic material may comprise oxide of iron admixed with about 15 p.ct. of oxide of chromium; the proportions being modified as found in practice to give the best results. The temperature of the catalytic body is maintained at a temperature somewhere between the limits of 300° and 650° C. It is found that by using a temperature between these limits and by employing a restricted quantity of water vapour, the hydrogen sulphide formed as a result of the reaction will not be fixed by the catalytic body, but will pass on with the other gases. Thus the process may be continuous; while the composition of the residual gas is not materially affected by the treatment.

Conversion of the sulphur compounds is also greatly facilitated by the addition to the catalyst of one or more of the promoters above referred to.

With reference to the quantities of water vapour employed in the conduct of the process, the patentees say they have found it is necessary to add only such quantities as are required to prevent the reduction to the metallic state of the catalytic material by the reducing action of the gas. For example, with the catalytic materials referred to above, at a temperature of 350° C., using coal gas, over 90 p.ct. of the sulphur content could be removed by the addition of 7 p.ct. by volume of steam (conveniently obtained by saturation of the gas at about 40° C.); the composition of the residual gas being otherwise materially unaltered.

Destructive Distillation of Wood and Like Carbonaceous Substances.—No. 131,006.

POORE, P., of Paternoster Row, E.C.

No. 13,321; Sept. 17, 1917. No. 4963; March 20, 1918.

This combined invention, relating to the distillation of wood, &c., has for its object to improve the yield of bye-products (particularly acetic acid and wood spirit), while reducing the period of distillation.

Accordingly the wood or other carbonaceous substance (in small pieces or in a finely-divided condition) is dried, whereby its content of water is substantially reduced, and then distilled within a retort to which heat is externally applied. After the charge is uniformly heated to such a degree that condensation of steam within the charge is precluded, superheated steam is caused continuously to pass through the charge, and the heating is continued. The gas and vapours evolved from the charge then pass out of the retort for the recovery of the condensates.

Hydrogen Gas Plants.—No. 130,701.

R. & J. DEMPSTER, LTD., and BALLINGALL, J. M., of Manchester.

No. 4802; March 19, 1918.

This invention has reference to the heating means employed in plant for the manufacture of hydrogen by the alternate oxidation and reduction of iron, "where, in particular, the supply of heat to the retorts for use in the reducing process is necessary, and when it is desirable to heat water gas before entering the retorts."

In the apparatus heaters are provided, which are not only separated

from the ordinary oxidizing and reducing retorts, but are arranged to allow of the passage of hydrogen and water gas through them at the proper periods. Thus at one period, hydrogen is flowing through the heaters, and giving up its heat to them; and, when this operation is stopped, water gas is caused to flow through the heaters, taking-up the heat recovered by them from the hydrogen. It is proposed to separate the heaters (or preheaters as they may be termed) from the chamber containing the ordinary hydrogen making and reducing retorts, so that the preheaters are not subjected to the hot furnace gases acting around the retorts. But the preheaters are placed in the path of, or so as to be externally subjected to, heat from the waste gases after these have passed through the retort chamber, and before they have passed to the chimney or chimney flue of the plant. By these means it is possible to recover heat both from the hydrogen and the furnace gases, and, in the former case, cool the hydrogen before it finally leaves the bench.

Removing Tar from Gas.—No. 131,125.

Heise, O. A. L., of Copenhagen.

No. 13,017; Aug. 10, 1918.

Regarding his invention of "an improved process for removing tar from gas," the patentee says: "In known processes the separated tar has a tendency to make the wood-wool or other filtering material previously employed clotty and impermeable, and therefore the purifying process very often has to be stopped for renewal of the material"—a drawback avoided by his process, which consists in passing the gas from below upwards through a mass of heath or the like, and introducing hot water from above, "which keeps the separated tar in liquid state, so that it can run away and be collected in a tank below."

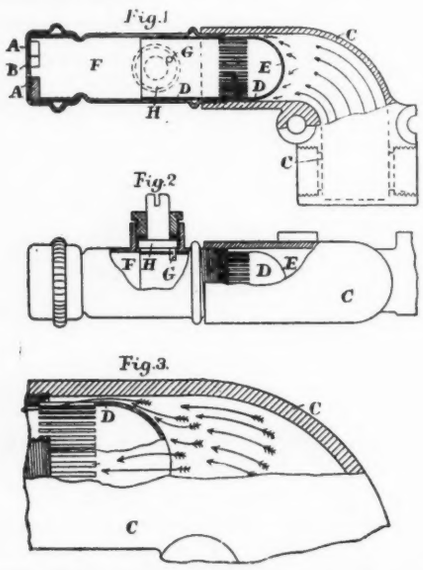
He claims: A process for removing tar from gas, in which the gas is passed from below upwards through a purifying mass (consisting of heath or the like material) besprinkled from above with hot water, so that the tar retained in the mass is dissolved and the purifying capacity of the apparatus maintained.

Regulating the Gas Supply to Atmospheric Burners.—No. 131,631.

Yates, H. J., of Aston, M. Howlett & Co., Ltd., of Hockley Hill, and Dolphin, J., of Harborne, Birmingham.

No. 10,311; June 22, 1918.

This invention has reference to means for so regulating the gas supply to atmospheric gas-burners used for heating as to prevent any hissing or roaring noise at the gas jet or nipple, notwithstanding various pressures in the gas-main.



Yates, Howlett, and Dolphin's Atmospheric Gas-Burner.

Fig. 1 is a side elevation (partly in section) of the nipple part of an atmospheric gas-burner constructed in accordance with patent No. 3868 of 1915. Fig. 2 is a part sectional plan, and fig. 3 is a part sectional side elevation, to a larger scale.

The tubular gas-nipple body is furnished with a rotatably mounted perforated cap formed with an internal gapped flange so that the apertures A in the cap are opened and closed consecutively by the solid portions of the flange as the cap is rotated. The inner or central apertures B in the cap are always open, as disclosed by the 1915 specification. The open back end of the nipple body is fixed in the tubular fitting C connected with the gas supply. D is a hollow piston-like sliding regulating valve in the inlet end of the nipple body, and the end E of it (opposed to the flow of the incoming gas) is made dome-shape or conical, and projects into the gas inlet pipe C. The rear straight portion of the periphery of the valve D is perforated with narrow slits, preferably made parallel with the axis of the sleeve and arranged at short distances apart all round it, so that the stream of incoming gas round the piston sleeve must pass through the perforations and then on and through the expansion chamber F (formed by the interior of the nipple body and the sliding piston sleeve D), and so on to the outlets in the cap.

This piston sleeve is preferably made of very thin metal, and the back end of the nipple body, in which the sleeve fits, is bevelled off (fig. 3); so that there is but a slight distortion of the lines of flow of the annular stratum of gas outside the perforations as it passes into and along the inside of the sleeve; and, owing to the closed end E of the sleeve being domed or coned, the streams of incoming gas are gradually (not suddenly) diverted to the annular space around the perforations through which the gas then passes. The piston sleeve is adapted to be moved longitudinally in the one or the other direction in the nipple body, and set in any desired position by (preferably) the action of a crank-pin device, consisting of a crank-pin G on a disc H on the end of a spindle in a stuffing box arranged at one side of the nipple body.

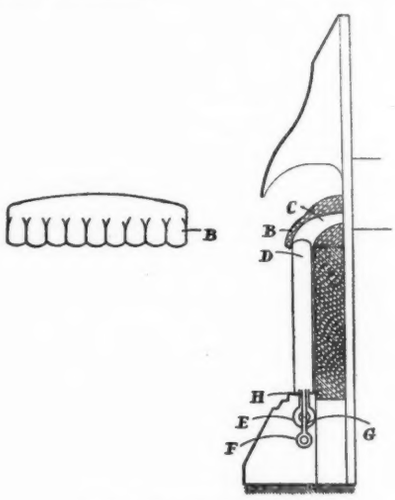
For a comparatively high gas pressure in the main, the piston sleeve D is, by the crank pin G, moved inwardly longitudinally—that is, towards the left—so as to shorten the slits in the sleeve by the front portions of the slits passing inside the nipple, and at the same time the expansion chamber F, of which the end E of the sleeve forms one end, will have its capacity decreased. Similarly, for a comparatively low gas pressure in the main, the sleeve has to be moved in the opposite direction (towards the right) to increase the length and area of the slits exposed to the incoming gas. This also lengthens the expansion chamber H and increases its cubical capacity.

Incandescent Gas-Fires.—No. 131,741.

Kelday, A. H., of Forest Hill, S.E.

No. 14,195; Aug. 31, 1918.

These incandescent gas-fires are of the kind in which the refractory material is mounted over the burner jets—means being provided for ensuring a long flame so that the upper as well as the lower part of the fuel is rendered incandescent.



Kelday's Incandescent Gas-Fire.

A sectional view of the fire is given; also a detail elevation of the upper overhanging part of the fire-brick backing.

This fire-brick backing has an upper and outwardly extending part B integrally formed of fire-brick or other refractory material, or with the upper part separately formed and secured to the backing by cement. In the upper part, separate passages are provided opposite to that in which the pieces of fuel D are disposed for the purpose of carrying away the waste gases to the chimney. The annular burners H are mounted upon a supply pipe E transversely extending in front of the fire and beneath, or in front of, which another pipe F is provided under independent control. Jet tubes G, in number corresponding to the number of the annular burners H and of the pieces of fuel, pass from the pipe F through the pipe E into central positions in the burners H. The pipe F may be provided for the supply of gas only to the central jet tubes G, or, alternatively, for the supply of a mixture of gas and air; while a mixture of gas and air is supplied from the pipe E through the annular space in the burners.

Lighting or Extinguishing Gas-Lamps Automatically.—No. 132,027.

Brown, A., of Wigan.

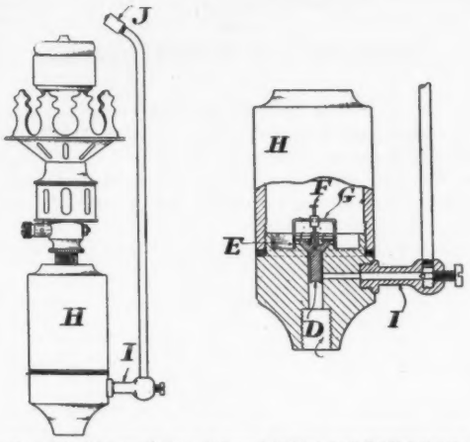
No. 14,285; Sept. 3, 1918.

This invention is primarily intended for the lighting or extinguishing of public lamps; the main object being to control the lamps by varying the pressure of gas in the service pipes or mains without affecting the normal flow of gas by reason of variation of pressure due to the consumption of the lamps.

An elevation is given of an incandescent gas-burner showing the invention applied to it; also an enlarged cross-sectional elevation of the relevant part.

The fitting at the base has a screwed opening for attachment to the supply pipe; while at the top of the opening is a regulating valve D, of the mushroom type, the outer periphery of which is in the form of a thin annular flange. Surrounding the valve is a detachable cylinder E, which restricts the passage of gas from the underside of the valve,

thereby ensuring a comparatively long lift of the valve. The valve is provided with a tubular extension upwards, which engages the lower end of a guide-pin F, free to rise and fall within a hole formed in a bridge-piece G, preferably in one with the cylinder. At its upper end the pin is provided with a disc-like head part; the pin acting as a guide for the valve and, by being separate from the valve extension D, being less liable to jamb as the valve rises and falls.



Brown's Automatic Gas-Lamp Lighter and Extinguisher.

A hollow cover H forms the upper part of the fitting, and is screwed to the base below the control valve D, or on the supply side of it is a bye-pass I connected to a pilot jet J. The stem of the valve D is fluted to allow free passage of gas to the burner when the valve is partially off its seating and also to allow gas to pass to the pilot jet.

A valve is used for each lamp or series of lamps, and the operation of the system is as follows: Assuming the pressure in the main to be the normal day pressure, the weight of the control valve is sufficient to keep it closed, and no gas can pass to the burner. When, however, the higher night pressure is turned on, each control valve is raised and remains so. Owing to the gas having to pass below and around the flange of each valve, and owing to the cylinder E around the valve tending to baffle the flow of the gas, the valve has a quick movement once the full pressure is reached. For a like reason the valve remains open, and is little affected by fluctuations in pressure due to the consumption of the gas—the gas below the flange of the valve acting as a cushion to check any tendency of the valve to close with the normal fluctuations of pressure. Upon the pressure of the gas being lowered to the day pressure, the valve closes, and shuts off the light. Or the valve can be regulated to remain fully open until any part of 1 in. below normal day pressure is reached. Then, when the valve is closed, the normal day pressure can be put on, and the valve remains closed until the next time of lighting. In this way each valve is rendered more or less unaffected by variations in pressure due to the consumption of the gas; while it is effective in opening at the predetermined pressure and closing after the pressure has been reduced below the day pressure, and remaining closed at this pressure.

To allow of the control valve being regulated to close earlier or with a less reduction of pressure than is normally required, the cylinder E may be made adjustable—*i.e.*, to expand and contract to accelerate or retard the flow of the gas from below the flange of the valve D.

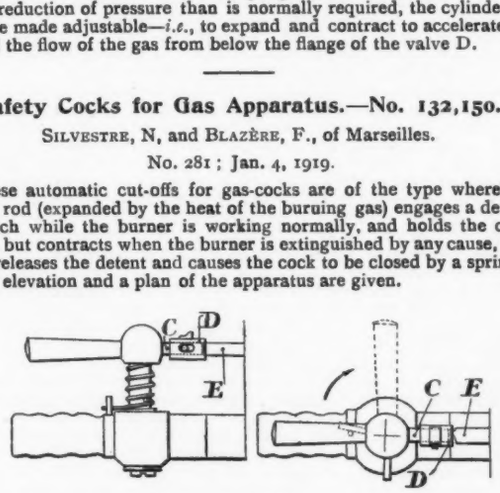
Safety Cocks for Gas Apparatus.—No. 132,150.

Silvestre, N, and Blazère, F., of Marseilles.

No. 281; Jan. 4, 1919.

These automatic cut-offs for gas-cocks are of the type wherein a metal rod (expanded by the heat of the burning gas) engages a detent or catch while the burner is working normally, and holds the cock open, but contracts when the burner is extinguished by any cause, and thus releases the detent and causes the cock to be closed by a spring.

An elevation and a plan of the apparatus are given.



Silvestre and Blazère's Safety Cock.

The plug of the cock is rotated into the closed position (shown in dotted lines) by a coiled spring. The head of the plug has a claw C, on which a slidable sleeve D is mounted with slight friction. A rod E, placed in a position where it is heated by the burning gas, has one of its ends in line with the claw, in the open position of the cock. It is free to expand; and (its other end being fixed) the expansion causes its free end to approach the claw.

When the gas is to be lighted, the cock is opened by hand and the plug kept in the open position by pushing a movable sleeve over the end of the rod, so as to engage with the latter. Under the effect of expansion, the rod lengthens, and pushes back the sleeve, but remains in engagement with it. If, however, the burner is extinguished while the cock is open, the rod (contracting) recedes from the sleeve, whereupon the cock is automatically closed by the action of the spring.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for Oct. 1.]

Nos. 23,220—23,813.

Aird, K.—"Inset gas-fires." No. 23,436.
Bray, H. P.—"Pipe connections, unions, &c." No. 23,749.
Brewer, W. J.—"Cock or tap." No. 23,721.
Cox, W.—"Prepayment meters." No. 23,727.
Curnow, A. J.—"Gas or oil cooking stoves." No. 23 407.
Duparc, L.—"Process for the direct oxidation of ammonia." No. 23,505.
Fairrie, J. L.—"Drying leather, &c., by gases." No. 23,347.
Glover & Co., G.—See Cox. No. 23,727.
Grace, R.—"Apparatus for heating water installations by coal gas." No. 23,322.
Harley, P. C.—See Brewer. No. 23,721.
Howes & Burley.—See Curnow. No. 23,407.
Ionides, A. C.—"Fluid meters." No. 23,295.
Larkin, F. S.—"Economizers for boiling-burners of gas-cookers, &c." No. 23,781.
Letourneau, J. P.—"Pincers for manipulating pipes placed in trenches, &c." No. 23,736.
Ogden, J. E. L.—"Apparatus for collecting and discharging water from compressed air or gas pipes." No. 23,688.
Pellery, R.—"Electric automatic gas lighter and extinguisher." No. 23,705.
Platt, M.—"Flow-meters." No. 23,451.
Staples, C. W.—See Cox. No. 23,727.
Stenning, H. A.—See Bray. No. 23,749.
Sterponi, B.—"Device for increasing intensity of light of incandescent gas-burners." No. 23,503.
Urfer, C.—See Duparc. No. 23,505.
Webster, S. A. D.—See Aird. No. 23,436.

LEGAL INTELLIGENCE.

GAS-METER INSPECTORS MUST BE PROTECTED.

Judge Cluer decided in the Shoreditch County Court, last Thursday, that gas inspectors had to be protected from dangerous dogs.

The plaintiff was Mr. F. A. Freeman, a gas-meter inspector in the employ of the Gas Light and Coke Company, and he sued the North London Moulding Works, Hackney, to recover £28 14s. 6d. damages for loss of wages, and pain and suffering as the result of being bitten by a dog at the defendants' premises.

Plaintiff said that on June 6 he called at the defendants' premises in the ordinary course of his duties to inspect the gas-meters. He was told by a partner in the firm that he could go down into the basement. He examined one meter; and as he was walking away from it, a dog flew out and bit him through the calf of the left leg. He was given 2s. to have the bite cauterized, but was unable to get a doctor to do it; and finally he had to go to the London Hospital. In all, he was laid up from duty for five weeks, and lost his wages at £3 9s. 7d. a week. He had made no claim against the Gas Company under the Workmen's Compensation Act. In the course of his duties, he had to visit a large number of factories, and always kept a keen eye open for dogs; but he never saw a notice, "Beware of the Dog," on this occasion.

Dr. *Phillipan* said the bite was a very severe one, and plaintiff could not go to business before he did.

Mr. Lincoln (for the defence) suggested it was plaintiff's own fault in not avoiding the dog or reading the notice "Beware of the Dog."

Judge Cluer: Suppose you do put up the notice, and then invite a person on to the premises, is it not for you to guard the visitor?

Mr. Lincoln: But you should not go near a dog.

Judge Cluer: He has any way to do his duty to the gas company.

Wm. Bonner, another inspector of the Gas Company, said that when he went there, the dog was taken away.

Mr. *Ginsberg*, one of the partners in the firm, said he told the plaintiff to go down, and a boy would show him the meter. Later he heard the man had got a slight "nick." He kept the dog to protect the stock at night.

The boy gave evidence that he forgot to warn the inspector as to the dog, as they were so used to it.

Mr. Lincoln suggested that a gas-meter inspector, with his experience, should be forearmed as to his danger.

Judge Cluer said there had been no contributory negligence. A person had no right to leave a dangerous dog in a position where it could bite, even if it were chained-up. Gas-meter inspectors had to be protected in their work, which must be carried out according to the rules under which the person had the gas laid on. It was for the owner of the dog to protect the gas-meter inspector. He awarded the plaintiff £15 1s. 2d. loss of wages, 2s. 6d. for the tear to the trousers, and £5 5s. for pain and suffering—£20 8s. 8d. in all, with costs.

The s.s. *Halo*, built by the Dublin Dockyard Company, Ltd., at their yard on the Liffey, and acquired by the Gas Light and Coke Company, has just finished successfully her speed trials. The *Halo* is a vessel of about 3350 tons deadweight capacity. She has four large holds; and ample water ballast may be carried in the double bottom and in large forward and after tanks—thus ensuring that the vessel will make efficient passages in heavy weather.

MISCELLANEOUS NEWS.

BELFAST GAS MANAGERSHIP.

Mr. Smith's Increased Salary.

At the Monthly Meeting last week of the Belfast Corporation, Alderman Craig moved the adoption of the minutes of the Council in Committee, by which it was resolved that, subject to approval in open Council, the salary of Mr. J. D. Smith, the Engineer of the gas-works, be increased to £1750, rising by two annual instalments to £2000—this to include all bonuses already granted, or to be granted, under any scheme at present under consideration. The Alderman explained that Mr. Smith had made application for a position in Glasgow, in regard to which applicants had been invited to state their own salaries, and he had asked for £1750, rising to £2000 in two years.

Mr. Alexander, in the course of the subsequent discussion on the subject, moved that the minute be sent back.

Sir Crawford M'Cullagh, ex-Lord Mayor, said if he were in Mr. Smith's position and the Corporation did not confirm what had been done in Committee, he would go elsewhere if he could not go to Glasgow. It was quite clear that the Glasgow Corporation were out to get the best man. So far as Belfast was concerned, their gain would have been Belfast's loss. If Mr. Smith went, and they got the wrong man in his place, they might lose twice the amount of the salary in a year.

On a division 13 voted for the amendment and 36 against. The minutes were, therefore, adopted.

SALFORD GAS UNDERTAKING.

Committee of Inquiry Appointed.

The Salford Borough Council at their meeting last Wednesday had under consideration the question of the Gas Committee and their management of the gas undertaking. From the minutes of the Committee it appeared that, in view of allegations of waste and extravagance in administration and management, the Committee had asked for an inquiry, and suggested that this should be held by the Stipendiary Magistrate. It was complained by the Committee that, owing to the absence of particulars, there had been no opportunity of dealing with the allegations.

Mr. Greenwood described the resolution of the Gas Committee as "a smart bit of side-tracking, in order to evade an inquiry." He contended that gas in the borough cost more than in neighbouring towns; and while he had great respect for the Stipendiary Magistrate, he thought the inquiry ought to be made by a gas engineer.

Mr. A. Williamson moved, as an amendment to a resolution to adopt the minutes, that they be passed with the exception of the resolution suggesting an inquiry. He said with regard to the charge of wastefulness and extravagance, that on one occasion land, which could have been bought at twenty years' purchase, was bought at one hundred and fifty years' purchase.

In the course of the discussion,

Alderman Phillips, the Chairman of the Gas Committee, complained of the constant heat with which the affairs of the Committee were discussed by certain members of the Council who "seemed to have diseased minds." He was in favour of an inquiry, when it would be found that the accused were free from reproach; and he wished it to be a thorough inquiry in which the Stipendiary Magistrate might call in a technical adviser.

Mr. Greenwood asked for an independent inquiry by an engineer, when he would be ready, he said, with information.

The amendment was lost by thirty votes to eighteen.

After some further brief discussion, the Council passed a resolution (on the suggestion of Alderman Worsley) that, in view of the allegations made from time to time of waste and extravagance in the management of the gas undertaking, the Council should appoint a Special Committee to inquire into the matter, with power to call in the assistance of an expert authority.

BIRMINGHAM COAL STOCKS AND THE STRIKE.

The probable effect of the railway strike on the Birmingham Corporation Gas Department was discussed by the Gas Committee on Monday of last week. It was mentioned that every effort was being made to conserve the stock of coal at the gas-works. Under normal circumstances, the stock would be sufficient to meet the demands for a further period of three to four weeks. It was anticipated, however, that in view of transport difficulties, many of the larger industrial works would have to close-down, with a consequent reduction in the demand for gas.

As to the Order of the Board of Trade containing provisions about the quality and pressure of gas to be supplied during the present crisis, it was stated by the Committee that, while giving effect to these regulations, every endeavour would be made to supply gas of such quality as to cause a minimum amount of inconvenience to the consumers. The Committee are in the fortunate position of holding a good stock of gas oil, which will help them to do this, and will also assist in conserving the coal stocks.

The chief anxiety of the Committee is in regard to the coming winter. The stock which they are now compelled to pick up is too small to meet the normal requirements during periods of fogs, snowstorms, and other hindrances to transport in the winter months; and when the present strike is over, it will be extremely difficult to replenish the stock of coal. This is, however, a difficulty which the Coal Controller will have to deal with as regards the whole of the gas-works throughout the country, which are in a similar predicament to those of Birmingham.

It was mentioned, as regards the tonnage of coal held at the present time, that the position is somewhat better than it was on the occasion of the coal strike in 1912. This lasted from March 1 to April 9; and drastic restrictions in the output of gas had to be resorted to at the beginning of the latter month.

PLYMOUTH COAL SUPPLY TROUBLE.

An Improved Situation.

The statement made by the "Western Morning News" which was reproduced in last week's issue of the "Journal" showed the danger in which Plymouth stood of suffering a total failure of the gas supply consequent on coal shortage, resulting from a dockers' dispute that affected the Company's deliveries.

It was added then that the strikers had been advised to return to work; and later reports indicated that they had consented to do so pending inquiry. Our contemporary says the announcement that the strike had been suspended occasioned a very great feeling of relief in Plymouth. Besides being dependent on gas for light, many householders also employ it for cooking; and the buying of oil and candles was very prevalent. Even more serious than this, the stoppage of the gas supplies would have had a material and damaging effect on the industry of the town; for though a few firms manufacture their own suction gas, no fewer than 250 are dependent on the Gas Company for the motive power for engines of various kinds. The chief trades affected would appear to be the printing industries, laundries, builders (for planing and sawing), brass foundries (for turning and polishing), and miscellaneous works. Some of the theatres also use gas for generating electricity. Even now it is not too much to say that the gas supply is jeopardized for the winter; for this is the season when normally there are large stocks of coal in hand.

Directly the agreement was reached, Mr. J. H. Ellis (the Chairman of the Plymouth Gas Company) carried out his declared intention to withdraw the notices that had been given to the Company's men.

HUDDERSFIELD CORPORATION ACQUIRE THE LONGWOOD AND SLAITHWAITE GAS COMPANY'S UNDERTAKING.

Yesterday week the undertaking of the Longwood and Slaithwaite Gas Company was acquired by the Huddersfield Corporation as a going concern. An event of such considerable local importance could not be allowed to pass, said the "Huddersfield Examiner," without some reference to the historical associations and development of the business which has been absorbed by the Corporation.

The Longwood Gas Company was formed in 1859, and, therefore, the year which marks the close of its existence is also the Diamond Jubilee of the undertaking. Longwood did not adopt the benefits of a public gas supply until more than fifty years after the formation of the first gas company in the country. It was on March 26, 1859, that the inaugural meeting of a few persons interested in the subject was held at Longwood, at which meeting the preliminary steps were taken which resulted ultimately in the formation of the company as a joint-stock undertaking. A general meeting of the inhabitants of Longwood and district, called by the public bellman, was held in the Mechanics' Hall; and after discussion the meeting unanimously resolved upon the formation of the company. The public were invited to take up shares; but a reservation was placed upon the amount allotted—no individual or firm being allowed to take up more than £100 of the first issue of £4000. This amount was readily subscribed; works were erected; and mains were laid to the designs and plans of Mr. Emmott, an engineer, of Oldham. At the commencement of supply the price charged was 6s. per 1000 c.ft.; and the following is an extract from the report presented to the general meeting of shareholders, held on June 27, 1860: "The sum charged for gas is at the rate of 6s. per 1000 c.ft., which, for a new company, is not an extravagant price, as the illuminating power of the gas has been proved to be equal to 15½ mold candles."

The plot of land upon which the works were erected comprised 7169 sq. yards, and was leased to the Company at £37 per annum. The land sufficed for manufacturing operations until 1901, when the works of the Colne Vale Gas Company were acquired. From its earlier stages the Longwood Gas Company passed through many vicissitudes. At one time as many as six gas-works were operating within the area of the Company. Two of these were bought over, and two came to grief. In 1898 there only remained one competitor—the Colne Vale Gas Company, which was formed in the year 1875. In July, 1875, the Royal Assent was given to the Longwood Gas Act, notwithstanding that seven distinct parties opposed the Bill before the House of Commons Committee—including the Corporation of Huddersfield, the London and North-Western Railway Company, Henry Saville (afterwards Lord Saville), the Linthwaite Local Board, and the Slaithwaite Gas Company. The opposition resulted in modifications being made in the original proposals of the promoters.

Although the Longwood Gas Company had obtained statutory powers, another company—the Colne Vale Gas Company—was promoted by some local millowners; and they proceeded to erect works close to the Longwood works. An Act of Parliament was applied for; but as the area scheduled was already covered by the Act granted to the Longwood Company, the application was unsuccessful. These were troublous, and indeed costly, times; for the mains of the new Company were already laid, and from time to time the Councils (then Local Boards) rendered them passive, if not active, assistance, largely

in the mistaken idea that competition in gas supply tended to keep down the price. Eventually, as the result of a series of conferences, the works of the Colne Vale Company were transferred in 1901 to the Longwood Company. By this transfer the Company came into possession of land which had been scheduled in the 1875 Act to be acquired by agreement, as well as some additional land. This necessitated a further application to Parliament; and notwithstanding much opposition from the Corporation of Huddersfield, the acquiring of the Colne Vale works was confirmed by an Act passed in 1902, the Company having commenced to operate them under a provisional agreement from July 1, 1901. The transfer was effected by the payment of a sum of £20,000; and in return the Longwood Company obtained a consumption amounting to about 14 million c.ft. per annum, over 6 acres of leasehold land, which has appreciated considerably in value, and property and other rents amounting to about £200 per annum. Six weeks after acquiring the Colne Vale gas undertaking the works were shut-down, and were subsequently dismantled. The buildings have been partly utilized as meter repairing, stove repairing, and fitting shops and stores, and partly let off to tenants.

In 1913 the Directors of the Longwood and Slaithwaite Gas Companies arranged an amalgamation of the two undertakings. The Slaithwaite Company was formed as the outcome of a preliminary meeting held in February, 1855, when it was resolved to ascertain the expense of laying down plant for the village of Slaithwaite "capable of supplying gas for 500 or 600 burners." A prospectus was issued inviting subscriptions for £2000; and in it the importance of gas not only for light and warmth, but also for culinary purposes, was referred to. The Slaithwaite Company was incorporated by Act of Parliament in 1876, and along with the Longwood Company showed consistently steady progress until the amalgamation in 1914.

One of the great factors which led to the amalgamation was, says our local contemporary, the possibility of abandoning the methods of carbonizing coal which then existed and erecting modern mechanically equipped works capable of manufacturing gas for the needs of the two districts. The construction commenced early in 1915; and, notwithstanding great difficulties (owing to war conditions), the works were brought into operation at the end of 1916. The new works, which cost a little over £40,000, would at to-day's prices of materials and labour have cost at least three times this amount. The quantity of coal carbonized in 1915 was 21,000 tons, and from it 211 million c.ft. of gas were manufactured, or about 10,000 c.ft. per ton. In 1918 the coal carbonized amounted to about 14,400 tons, and 219,478,000 c.ft. of gas were produced, or at the rate of 15,240 c.ft. per ton of coal. Although over 8 million c.ft. of gas more were manufactured, the quantity of coal used was 6600 tons less.

Notwithstanding electrical competition, the output of gas in the Longwood and Slaithwaite areas has shown steady progress; the quantity sold to-day being about four times that of a quarter of a century ago. The Corporation are thus acquiring a property of a thoroughly progressive character, and with up-to-date equipment for the production of cheap gas. The incidence of the war has naturally entirely upset the estimates as to the cost of gas production; but it is certain the cost would "have been appreciably higher had it not been for the success which has attended the working of the new plant."

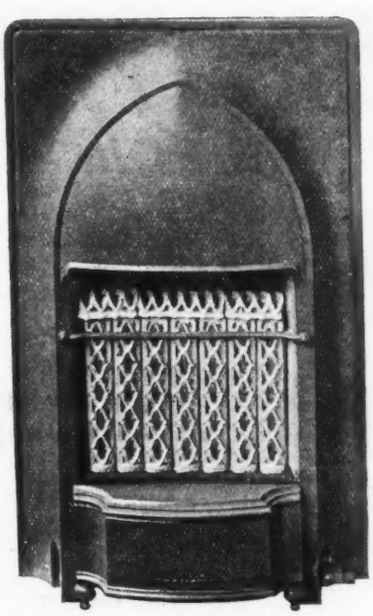
The Directors of the Company at the time were Mr. Benjamin Broadbent, C.B.E., M.A., J.P. (Chairman), Mr. William Crowther, O.B.E., J.P. (Vice-Chairman), Messrs. Thomas Mallinson, J.P., Sam Haigh, and James R. Hall. The Engineer and Secretary, who had been with the Company for the last 23 years, and who vacated office under the transfer, was Mr. J. H. Brearley.

WALTHAM ABBEY AND CHESHUNT GAS COMPANY.

Extraordinary General Meeting.

An Extraordinary General Meeting of the Company was held at No. 5, Great Winchester Street, E.C., on Tuesday, the 23rd ult. It was presided over by Mr. E. L. BURTON, who has succeeded Mr. Alfred Kitt as Chairman.

The CHAIRMAN read the resolution passed at the last meeting, which was to the effect that the report be referred back to the Directors, who were empowered to call to their assistance Messrs. Cash, Stone, and Co., to investigate the affairs of the Company for the past two years. Since then, he said, the report of Messrs. Cash, Stone, and Co. had been received; and while in some respects it was admirable, for his purpose it was inconclusive. It had eventually been decided to examine the accounts for the past five years; and the accounts had also been audited by Mr. Clarkson. He did not propose to read the reports. Mr. Clarkson, however, found that in 1914 the sum of £6784 had been charged to revenue account; and that this amount, except £309, should have been charged to capital. A further sum of £928, which had been written-off in respect of alteration to the works, seemed also excessive; so it was arranged that £619 of this should be charged to repairs of works for the past half year, and that £309 should be charged to the suspense account, as might be determined hereafter. A sum of £6400 was thus left which they could possibly bring back to the revenue account. Mr. Clarkson thought that the depreciation which had been written-off in the past had not been dealt with completely during this period. Irregular amounts had been charged; and for several years no such amounts had been written-off. Very properly Mr. Clarkson systematized matters, and arrived at the conclusion that £3624 should have been written-off as depreciation of gas-meters, and a further £835 for gasholders. Accordingly a sum of £2071 had been credited to capital account; and it appeared in the balance-sheet for this half year. Mr. Clarkson also found that £2855 had been expended on stoves and fittings without reference to renewals, and, on the other hand, that the deterioration of the whole of the stoves and fittings—going back to the early years of the Company—



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WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 6, Narrow Wine Street, BRISTOL; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE.

amounted to £4086. This was the cost of the stoves and fittings purchased during the series of years under audit, and ought to have been charged to capital account. The amount expended during the years 1914 to 1918 on extensions and improvements, less allowances for depreciation of holders, meters, stoves, &c., was £783; and this sum appeared in the profit and loss account.

Mr. J. Eve said that, if they had been present at the February meeting, they would have heard a discussion as to how the Company's accounts had been prepared for the last six years; and the Secretary (Mr. W. B. Randall) then admitted that, if there had been a proper allocation between capital and revenue, there would have been a credit balance to the profit and loss account of £16,500, instead of a debit balance of £359. They could understand, therefore, why the accounts had been referred to the accountants. Messrs. Cash, Stone, and Co. stated that the sum of £700 per annum would cover the depreciation on the various items just mentioned by the Chairman. Mr. Clarkson allowed for the four years 1914-18 the sum of £5226, as against Messrs. Cash, Stone, and Co.'s £2800. They would thus see that there was a difference of over £2000 which could be brought to the profit and loss account. The Chairman had referred to the sum of £783 brought to the credit side of the profit and loss account; and it really did seem as if the account had been "rigged up" to show a small sum paid into that account. A total sum of £7404 had been included in the revenue account which ought to have gone to capital expenditure account. The whole thing turned upon the admission of the Secretary at the last meeting. If he was right, then where were the figures?

The Chairman: He was wrong. He gave the figures out of his head.

The Secretary (Mr. W. B. Randall) explained that Mr. Eve wrote him on the morning of the meeting asking "how much of the amount chargeable to capital had been charged to revenue for a certain number of years?" And against his own judgment in the matter, he was asked to mention the amount, which was £16,500. The whole affair really amounted to a "storm in a tea-cup."

Mr. Eve said that, if there was a "storm in a teacup," the Secretary was responsible for it. He (the speaker) had done his duty; and he contended that there ought to be sufficient brought back to the profit and loss account to show a larger dividend. He was of opinion that these accounts had been "rigged up."

The Chairman proposed that the report of Messrs. Cash, Stone, & Co. be received.

Mr. Eve seconded this; and it was carried.

The Chairman said they would now go forward in a straight manner; and if any devious practices were permitted, he should terminate his connection with the Company.

The action of the Directors in having the accounts investigated was approved.

On the motion of Mr. F. R. Smith, seconded by Mr. Nicholls, the Chairman was elected a Director.

Mr. J. Paxton Clarkson, F.S.A.A., and Mr. Lewis Hardy, F.C.A., were appointed Auditors; and Mr. J. Randall, the retiring Auditor, was thanked.

It was stated that Mr. W. B. Randall, the retiring Secretary and Manager, would continue in the position until Mr. F. Smallbone (his successor) could take up his duties.

A dividend was declared for the half year to June 30 at the rate of 2 p.ct. per annum on the "A," "B," "C," and "D" shares.

EFFECT OF THE ALTERED QUALITY OF GAS.

The Gas Light and Coke Company's Notice to their Consumers.

The following notice, signed by the Secretary (Mr. W. L. Galbraith), and dated the 1st inst., has been issued by the Gas Light and Coke Company to their consumers.

In Consequence of the Railway Strike

Coal supplies to our works are suspended.

There are certain stocks of coal and oil at the works; but without supplies coming in daily, there are physical difficulties in the way of getting sufficient quantities of coal into the retorts to maintain a full output of normal quality gas.

The Government have ordered the Company to reduce the quality of the gas supplied, in order to get the greatest possible output from the coal available.

Consumers may therefore experience temporary trouble, owing to their burners requiring adjustment to the altered quality of the gas. Those who do so should notify the nearest office of the Company, when attention will be given as speedily as possible, though that may not be as promptly as could be desired.

Pending adjustment by the Company's workmen, consumers should, by more or less closing the air-ports, temporarily reduce the supply of air to burners giving trouble.

Consumers are reminded that during the continuance of the strike they are required by the Government to observe the strictest economy in the use of gas.

By so doing, they may render it possible for the Company to maintain throughout the 24 hours an adequate supply of gas, which otherwise would have to be reduced, and so cause great inconvenience to all who are dependent on gas for lighting, cooking, heating, and power purposes—including important food distribution centres.

The Company invite the co-operation, and bespeak the patience, of their consumers in the present very difficult circumstances.

Position of the Peterborough Gas Supply.—The gas supply of Peterborough, which it had been announced would cease last Saturday, is being continued. The Chief Constable has been empowered to requisition coal that is on the railway sidings.

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DEAD BEAT INDICATORS

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No glasses to break and nothing to clean.

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Incorrodible, Accurate, for foul or purified gas.

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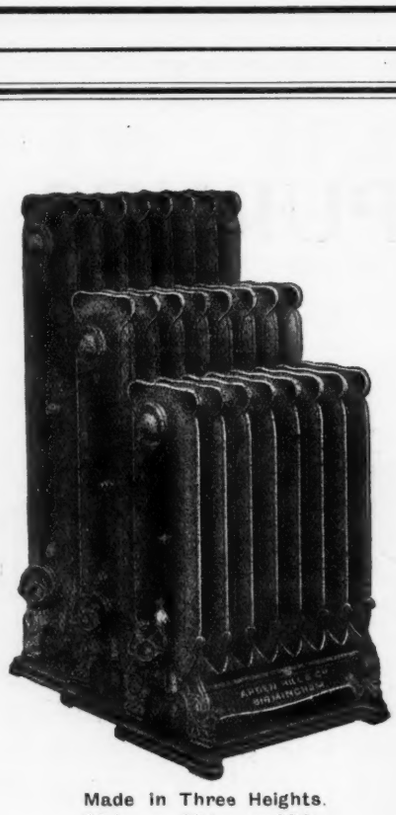

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"MARS" Gas-Heated - Steam - RADIATORS

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VOLUME OR VALUE.

The following paragraph, taken from the October issue of the "Co-Partnership Journal of the South Metropolitan Gas Company" is referred to in our editorial columns.

The intention of our Company to accept without reservation the conclusions of the Fuel Research Board on gas standards, and, as a logical consequence, to apply to Parliament for powers to charge for gas according to its heat value—that being in practice the only value that matters—has been vigorously criticized by eminent representatives of the gas undertakings who supply a larger bulk of gas per thermal unit than we have been in the habit of delivering to our consumers, and who naturally wish to be paid for the bulk rather than for the heat contained in it. The gas supplied in the South Metropolitan area is straight coal gas of high calorific power; and it seems to us unfair for the price per 1000 c.ft. to be compared with that charged by neighbouring companies who supply a mixture of coal gas and some other gas, of which a larger volume has to be consumed to produce the same heating effect. If the consumer gets as much heat in (say) 850 c.ft. of one gas as he does in 1000 c.ft. of another, why should the charge not be made for the heat units, which do really matter to him, instead of the cubic feet, which matter very little? The only objection we can see is that based upon the hope that "the man in the street" will hold to the belief that one gas is as good as another, and give a certain amount of undeserved credit to the company which supplies a low-grade gas at a low price per 1000 c.ft. There certainly seems to be a *primâ facie* case for the reform which Dr. Carpenter is pioneering. But, like all pioneers, he will have great opposition to encounter, and may not get much help from the Technical Press, which cannot be reasonably expected to disregard the fact that most gas companies (*i.e.*, most of its subscribers) would in this matter rather go on in the old pre-war paths. When a proposed reform is in advance of popular ideas, one has to wait a long time before the Press takes the side of the pioneer of the reform; but incidentally it often helps his propaganda by criticism.

INDUSTRIAL POISONING.

One of the sections of the newly-issued annual report (for 1918) of the Chief Inspector of Factories and Workshops is on "Industrial Poisoning," by Dr. T. M. Legge, C.B.E., Medical Inspector of Factories, who reviews briefly the incidence of poisoning and industrial disease during the period of the war.

Giving statistics for the years 1917 and 1918, and referring to coal gas, he says that, of the total cases, nine occurred at gas-works (with four deaths), in cleaning and repairing operations; five were reported from the back-lighting of a muffle-furnace in a work-room; and ten from a muffle-furnace with ineffective draught. Two men were fatally gassed while repairing a holder in a chemical works; and as they were employed by an outside firm of engineers, they were not missed until two days had elapsed, after which time, search being made, their bodies were found at the bottom of the holder.

Of the total number of cases of power-gas poisoning in the two years, three were due to feeding operations, and sixteen to cleaning and repairing. Three occurred to men some distance away, on to whom the fumes were blown.

Some examples are given of acute poisoning by benzol. In one case, a man was employed as a stillman, and succumbed to inhalation of benzol vapour, which had escaped into the benzol-house owing to an increase of pressure on the steam-boilers causing a quicker distillation of the vapour than the condenser was capable of dealing with. He recovered and returned to work, but died two days later without direct evidence of any further gassing. A fatality to a man who had entered a benzol tank-wagon (after precautions had been taken) to remove sediment, led Mr. Jackson (the District Inspector) to recommend: (1) Thorough boiling-out with water, the mud being raked over at the same time; (2) filling and emptying with water immediately before entry; (3) provision of a respirator giving an air supply from outside the tank while anyone is inside it. A somewhat similar accident, though not fatal, occurred in the cleaning out of a deposit of naphthalene at the bottom of a tank-waggon used for carrying creosote oil from tar distilleries.

By an arrangement with the occupiers of the principal factories in South Wales for the manufacture of briquettes, reports have been obtained of cases of pitch ulceration which came to their knowledge. These cases were usefully followed up by inquiry by the certifying surgeon, so that for the years 1914-18 particulars have been received of 64 men who have been affected, some of them more than once in the time stated. This, says Dr. Legge, is a very disappointing result, following on the inquiry which was made by Mr. A. H. Lush in 1911, and again in 1913, into the need for regulations requiring washing and bath accommodation, overall suits, prevention of dust, and protection against injury to the eyes. Improvements made to reduce the excessive dust have not been very successful.

NEW ZEALAND COAL AND NATIONALIZATION.

The New Zealand Board of Trade were twelve months ago authorized to inquire into the coal industry of the Dominion; and their report forms the subject of an article in our "Board of Trade Journal," from which the following is taken.

Considerable thought was devoted to the question of the desirability and practicability of nationalizing the mines of New Zealand; and as a result the Board express the opinion that some form of nationalization is urgently needed as an essential step towards removing short-

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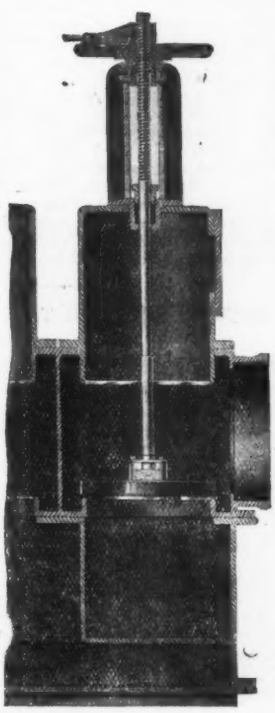

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comings of long standing, effecting needed improvements of a positive kind, and avoiding evils that threaten to turn the industry out of the course of healthy and sane development.

But the Board think this desired change should not take the form of State purchase and direct management of the mines. They believe that direct State ownership and management, though it might lead to some of the objects in view, would not foster the highest degree of enterprise, initiative, and resourceful management, nor the necessary single-minded regard for efficient service from all ranks, nor the accumulation out of the profits of the industry of the fund adequate to its future development without becoming a burden on the other industries of the Dominion. The most pressing need is to combine the undoubted advantages of centralized policy and management with those that may reasonably be expected to result from representation of labour and of consumers (through the State) on the controlling body.

The Board therefore strongly urge the immediate institution of a Dominion Coal Board (for both development and conservation). This Board should consist of representatives of (1) existing coal-mining companies; (2) employees of these companies; and (3) the Crown.

It is suggested that the Board should comprise five members at most —the companies to appoint two members, the coal-workers two, and the Crown one, who shall be President. If the Board took over the function of distribution, the employees engaged in that branch would exercise a voice in the selection of the representatives of labour on the Board. The nominee of the Crown should be appointed for a definite term. The representatives of the coal companies should be elected by the shareholders, voting by a method similar to that prescribed for the election of the directors of a company under the Companies Act. The representatives of the coal-workers should be elected annually, according to a system to be determined after consultation with the workers. In order to establish some continuity of policy, the members of the Board should retire from office, not as a whole, but one representative at a time of each of the two interests of capital and labour. This would involve a two-years' term of office for each representative; but he should be eligible for re-election.

The Dominion Coal Board should be in a position to achieve effectively the objects detailed below and similar aims:

(1) The introduction of economies in the cost of producing the output of coal.
(2) The conservation of the coal resources of the Dominion, with due regard to the most equitable distribution of the available supplies as between present and future needs; the systematic and easy development and expansion of the industry to satisfy the growing requirements of the community.
(3) The concentration of the industry at any given time in the most profitable fields.
(4) The removal of the causes of labour unrest. Subsidiary to this is the institution of proper housing for mine workers.
(5) The inauguration of an efficient system of distribution.
(6) The regulation of coal prices in the interests of consumers.

To these ends, the Board should be empowered to take over the existing coal companies with their assets and liabilities at valuation, and to issue stock to the existing shareholders in exchange for the shares held by them at the average market value of such shares for the period of the three years immediately preceding such exchange; such average market value to be calculated and determined by a specially appointed Commission. Existing company law should apply to the Dominion Coal Board; but it should be modified wherever required to permit the Board to exercise the functions necessary to achieve the objects in view. Stockholders should be guaranteed a pure interest rate of 4 p.ct. on their paid-up capital. From the balance left, after payment of this rate, working and maintenance expenses, and making provision for renewals and depreciation and reasonable development, there should be paid: (1) A risk rate to stockholders; and (2) bonuses to stockholders and employees in the proportions respectively of the amount of dividend calculated at the pure interest and risk rates combined and the total amount of the pay-roll of the Board.

The Board should also take over, administer, and develop the existing coal mines of the State. The industry should be subject to taxation and rating in common with all other industries.

MOTOR SPIRIT AND THE PROFITEERING ACT.

Under the provisions of the Profiteering Act, the Board of Trade have made an Order declaring "motor spirit used or capable of being used for supplying motive power to motor vehicles, whether taxed or not, to be an article in common use by the public," and ordering that the Profiteering Act, 1919, shall apply to such motor spirit.

At the same time, the Board fixed the following as the maximum prices which may be charged on the sale of such spirit.

Maximum Wholesale Prices for Spirit—in Cans.

	Per Gallon.
Aviation	2s. 10d.
Special boiling-points	2 8
No. 1	2 8
No. 3	2 6

For delivery to commercial consumers (not for re-sale) in steel barrels, 1d. per gallon less than can price: and for delivery in bulk to commercial consumers (not for re-sale), 1½d. per gallon less than can price. 1d. per gallon to be added to all above prices when sold for delivery in Scotland or Ireland.

Maximum Retail Prices.

The maximum price at which motor spirit may be sold by retail shall be the delivered price per gallon to the retailer, with an addition of 4½d. a gallon. Quantities less than a gallon shall be sold at a price proportionate to that charged per gallon.

Where motor spirit is delivered by a retailer to a purchaser at any place other than the retailer's place of business, an extra charge at the rate of 1d. for a gallon or for any part of a gallon may be added to the price permitted by this Order.

THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 6.

Pitch continues in a strong position, and there is a considerable amount of inquiry. A price of well over 75s. per ton net f.o.b. makers' works is obtainable. Creosote is steady at about 6d. per gallon net and naked. Other prices are: Anthracene, 9d. per unit, casks free; pyridine, 4s. to 4s. 3d. per gallon; solvent naphtha 95/160, 2s. 6d. per gallon; pure benzol and pure toluol, 2s. 9d. per gallon.

In sulphate of ammonia, the position remains unchanged.

Tar Products in the Provinces.

Oct. 6.

The average values for gas-works products during the week were: Gas-works coal tar, 37s. 3d. to 42s. 3d. Pitch, East Coast, 66s. to 67s. 6d. per ton f.a.s.; West Coast—Manchester, 55s. to 57s. 6d.; Liverpool, 55s. to 57s. 6d., Clyde, 65s. to 70s. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.ct. at 120° C., 11½d. to 1s. 0½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 2s. to 2s. 2d. Heavy naphtha, North, 2s. 1d. to 2s. 3d. Creosote, in bulk, North, liquid, 5d. to 5½d.; salty, 4½d. to 4¾d. Heavy oils, in bulk, North, 6d. to 6½d. Carbolic acid, 60 p.ct., 1s. 6d. to 1s. 6½d. Naphthalene, £15 to £17 10s.; salts, £4 10s. to £6, bags included. Anthracene, "A" quality, 7½d. to 7¾d. per minimum 40 p.ct.; "B" quality nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

Very little information has come into my possession since my last report was written; but the little which has reached me is not at all encouraging. Works have never properly recovered from the coal

STOCK MARKET REPORT.

THE momentous events of last week, as might be expected, were not without their sinister influence upon the Stock Exchange, but happily were less harmful than they might have been. There was a good attendance at the opening, and, in expectation of sales, prices were as a precautionary measure marked-down. But the looked-for sales did not materialize; and the closing figures of the week before were well maintained. Tuesday was very quiet; mail advices being interrupted, and the strained position enjoined the utmost caution in dealing. Many abstained altogether. Things improved next day, and many lines were looking up. Confidence in a solution increased on Thursday, with rising prices; and although on Friday there was slight reaction, the advances were not wholly lost.

In the gilt-edged market, the firmness of Home Government issues was remarkable; and on Friday Consols marked 51⅜, War Loan 94⅛, Funding 77½, and Victory 84⅝. Home Rails were very quiet, but not weak. In response to inquiries made there was no appreciable disposition to sell. Canadians and Argentines were irregular.

In the Foreign Market, French Loans oscillated almost daily, in accordance with the exchange; and there was at first some inquiry for Russians. Chinese were firmer.

In the Miscellaneous Market, there was a good deal of jumpiness in lines especially exposed to strike influences. Rubber was thrown down, and afterwards rebounded; and Oils had anything but a smooth passage. Ships went fairly well; and Textiles and Iron and Steel met with support.

Business in the Gas Market fell back again in point of volume of transactions recorded. Few undertakings were dealt in at all, and eight important issues furnished only a single bargain apiece. Owing to the torpor and an indisposition to sell, there was hardly any movement; and the prices marked were almost a repetition of those of the previous week. Excluding an *ex div.* variation, there was but one change in quotation—South Metropolitan being a point easier.

Bargains done for cash during the week were as follows: On Monday, Alliance and Dublin 49, 49¼, European 12, Gas Light ordinary 59, ditto debenture 54, Imperial Continental debenture 80, 80¼, Primitiva preference 67s. 6d., 68s. 9d., South Metropolitan 59, 59½, 60. On Tuesday, Alliance and Dublin 46, Bournemouth "B" 10⅜, Gas Light ordinary, 58⅛, 60, ditto preference 66, Imperial Continental 125½, South Metropolitan 59. On Wednesday, Alliance and Dublin 47, Gas Light ordinary 58, 59, Imperial Continental 124, South Metropolitan 58, 58½, 59, ditto debenture 50. On Thursday, Alliance and Dublin 47½, British 25⅛, 25⅝, Gas Light ordinary 58½, 59, 60, ditto preference 65½, Imperial Continental 125, 125½, 126, ditto debenture 79, 80¼, Monte Video 13¼, Primitiva 30s., ditto preference 65s., South Metropolitan 58½, 60, ditto preference 94½. On Friday, Gas Light ordinary 59, Imperial Continental 124, South Metropolitan 58, 60, South Suburban 68.

In the Money Market, there was at first a fair demand; but this was soon more than met by the release of a very large amount of money. Supply continued over-abundant, and extreme ease marked the close of the week. Silver moved wildly; from 61⅛d. it rose on Thursday to the record price of 64½d., only to fall next day to 63d. The bank rate is 5 p.ct., as fixed on April 5, 1919.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares	When ex-Dividend	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME	Closing Prices. July 30, 1914	Present Prices.	Lowest and Highest Prices of Bargains.
182,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	
1,551,868	"	Sept. 26	2½	2⅞%	Alliance & Dublin Ord.	59—64	43—48*	46—49¼
274,000	"	July 11	4	4%	Do. 4 p.c. Deb.	76—79	60—62	..
280,000	5	April 29	7½	8%	Bombay, Ltd.	5⅞—6⅛	5½—6¼	..
80,000	10	Aug. 28	16	19%		20—30	15—20	..
588,110	10	"	7	7%	Bourne- mouth Gas and Water { B 7 p.c.	15—15½	10—11	10⅞
115,000	10	"	6	6%	Pref. 6 p.c.	13½—14	9½—9⅝	..
159,740	—	June 27	—	4%	4 p.c. Deb.	..	65—67	..
992,045	Stk.	July 11	14	37/-	Brentford A Consolid.	361—366	55—60	..
784,920	"	"	11	31/8	Do. B New	304—309	50—55	..
55,000	"	"	5	6%	Do. 5 p.c. Pref.	109—111	76—78	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—93	64—66	..
214,775	"	Sept. 11	11	7½%	Brighton & Hove Orig.	208—218	123—128	..
344,200	"	"	8	5⅔%	Do. A Ord. Stk.	154—159	84—87	..
988,500	Stk.	"	5	6%	Bristol 5 p.c. max.	..	..	..
580,000	20	Sept. 26	12½	10%	British	44—45	25—27*	25½—26⅞
190,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88—90	68—65	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—58	..
100,000	10	—	—	—	CapeTown & Dis., Ltd.	1½—2½	6½—7	..
100,000	10	—	—	4½%	Do. 4½ p.c. Pref.	4—5	6½—7½	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	61—66	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,280	"	Aug. 14	5/9/4	80/-	Commercial 4 p.c. Stk.	106—108	55—60	..
550,000	"	"	5½	98/8	Do. 5¼ p.c. do.	108—105	54—57	..
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	50—52	..
800,000	"	"	4	—	Continental Union Ltd.	76—79	43—48	..
200,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	65—70	..
51,600	Stk.	Aug. 28	14½	12%	Croydon A 10 p.c.	..	150—160	..
378,400	—	"	11½	9%	Croydon B and C 7 p.c.	..	105—115	..
493,270	Stk.	"	6	6⅔%	Derby Con. Stk.	125—126	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	103—104	..	..
1,009,180	10	July 30	10	5/0	European, Ltd.	17½—18	12—14	12
16,298,975	Stk.	"	4/17/4	80/-	Gas { 4 p.c. Ord.	98—102	58—61	58—60
2,600,000	"	"	8½	96/8	Light { 8½ p.c. max.	76—79	47—49	..
4,062,335	"	"	4	4%	and { 4 p.c. Con. Pref.	96—99	65—68	65½—66
4,074,850	"	June 11	8	8%	Coke { 8 p.c. Con. Deb.	72½—74½	52—55	54
180,000	"	"	10	10%	10 p.c. Bonds	..	..	..
82,500	"	Sept. 11	5	4⅓%	Hastings & St. L. 5 p.c.	..	57—62	..
958,740	"	"	8½	2⅞%	Do. 3½ p.c	37—39	42—47	..
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16¾	7⅞—8⅛	..
56,506	Stk.	Aug. 28	9	8½%	Hornsey 7 p.c.	..	110—115	
181,000	"	Sept. 11	7½	5⅔%	Ilford A and C.	151—154	88—93	..
65,780	"	"	6½	4⅔%	Do. B	115—118	67—72	..
65,500	"	June 27	4	4%	Do. 4 p.c. Deb.	93—94	61—64	..
4,940,000	"	May 14	9	4½%	Imperial Continental	150—160	124—129	124—126
1,285,000	"	Aug. 14	8½	3½%	Do. 3½ p.c. Deb. Red.	84—86	79—81	79—80½
385,942	"	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	87—92	..
2,498,995	"	Feb. 26	10	4⅔/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
					{ B	148—143		
806,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	"	Aug. 14	7/5/6	83⅔%	Maidstone 5 p.c.	..	56—61	..
76,000	5	June 11	6	8%	Malta & Mediterranean	4½—4¾	3½—3⅔	..
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97*	..
541,920	20	May 29	4	5%	Monte Video, Ltd.	11½—12	12½—13½	13½
1,876,892	Stk.	July 30	4½	5⅔%	Newcastle&Gatsh'd Con.	98½—99½	62½—63½	..
599,795	"	June 27	8½	8⅔%	Do. 3½ p.c. Deb.	86—88	57—58	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	..	13½—13⅔	..
55,940	10	"	7/14/0	7%	" " 7 p.c.	14—15	9—9¼	..
900,000	Stk.	May 14	8	8%	Oriental, Ltd.	117—122	103—106	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	4⅔—5⅓	..
60,000	50	Aug. 28	18	7½%	Portsea, Island B	128—131	74—76	..
100,000	50	"	12	6⅔%	Do. C	118—121	56—58	..
249,980	5	April 29	6	—	Primitiva Ord.	5¼—6	1½—2	80/-
499,960	5	June 26	5	—	Do. 5 p.c. Pref.	4⅔—5	3⅔—3⅔	65/—68/9
621,600	100	June 2	4	4%	Do. 4 p.c. Deb.	91—98	71—73	..
600,000	Stk.	July 30	4	4%	Do. " " 1911	..	49—52	..
846,198	"	June 27	4	4%	River Plate 4 p.c. Deb.	85—87	49—52	..
150,000	10	Sept. 26	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8*	..
195,000	50	July 2	5	5%	{ 5 p.c. Deb.	47—49	40—42	..
185,000	Stk.	Aug. 28	10	5%	Sheffield A	228—234	81—85	..
209,984	"	"	10	5%	Do. B	222—224	81—85	..
528,500	"	"	10	4⅔%	Do. C	220—222	70—72	..
183,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	June 27	9	10%	South African.	10½—11½	12½—13½	..
6,609,895	Stk.	Aug. 14	5/4/0	80/-	South Met. 4 p.c. Ord.	111—113	58—61	58—60
250,000	"	July 11	—	5%	Do. Pref.	..	94—96	94½
1,895,445	"	"	8	8%	Do. 3 p.c. Deb.	72½—74½	52—54	50
294,920	"	Aug. 14	8½	5%	South Shields Con. Stk.	157—159	104—106	..
959,795	"	"	6	8⅔%	S'th Suburb'n Ord. 5 p.c.	114—116	68—73	68
187,558	Stk.	June 27	5	5%	Do. 5 p.c. Deb. Stk.	116—118	88—91	..
647,740	"	May 14	7½	5%	Southampton Ord.	99—102	68—68	..
121,275	"	June 27	4	4%	Do. 4 p.c. Deb. Stk.	..	63—65	..
190,000	"	Aug. 14		4⅔%	Tottenham { A 5 p.c.	135—138	70—75	..
782,275	"	"	6	5%	District { B 5½ p.c.	115—117	50—55	..
181,255	"	June 26	4	4%	{ 4 p.c. Deb.	87—89	64—66	..
189,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
226,476	Stk.	Sept. 11	5	5%	Tynemouth 5 p.c. max.	108½—109	80½—82½	..
80,000	"	Aug. 28	8⅔	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—155	85—90	..
265,636	"	"	6½	40/-	Do. B 5½ p.c.	129—134	63—68	..
108,078	"	"	—	38/6	Do. C	..	63—68	..
140,855	"	"	—	38/6	New Ordinary	..	63—68	..
262,000	"	"	6⅓	38/9	Wimbledon 5 p.c.	117—122	65—70	..
98,000	"	"	6⅔	40/-	Epsom 5 p.c.	121—126	65—70	..
88,416	"	June 27	3	3⅔%	5 p.c. Deb. Stk.	66—69	49—51	

* Ex Div.

strike; and the present condition is that there are very meagre stocks of coal available, and there is little prospect of fresh supplies until the railway strike is settled and traffic conditions become more normal. Bye-product outputs are consequently certain to be restricted for some time to come, which will necessitate a readjustment of values in many lines. The Continental trade in pitch is shut-off for the present, and generally the markets are marking-time. Makers do not seem anxious to sell; but there is rather a tendency to await something definite in the labour situation before making contracts. Quotations are nominal generally, on the basis of rates mentioned last week.

Sulphate of Ammonia.

The railway strike will seriously interfere with the trade in sulphate of ammonia, since not only are manufacturers unable to obtain their raw materials, but deliveries cannot be made to farmers, except in the few instances where local dealers possess stocks. It is stated on good authority that the deficiency which results from the present operation of the railways is to be made good by an advance in goods rates, which, in turn, must add to the cost of the production of sulphate of ammonia. It would, therefore, not be surprising if a further advance in quotations for this product had to be made. But even so, sulphate is practically the cheapest nitrogenous fertilizer on the market. Sulphate of ammonia contains just over 20 p.ct. nitrogen, whereas its chief competitor, nitrate of soda, contains only 15·5 p.ct. This means that, if sulphate of ammonia sells at £22 per ton, nitrate of soda is worth no more than £17 per ton. And the latter simply cannot be delivered here at anything like this price.

Gas Restriction in Berlin.—By a new order, the Berlin restaurants are only to be allowed to use for lighting purposes 35 p.ct. of the amount of gas and electricity consumed by them per month in the year 1916.

Belfast Gas Accounts.—The accounts of the Belfast Corporation for the year 1918-19, just issued by the City Accountant, show a total indebtedness of £494,000 in respect of the gas undertaking, the net profit on which is returned at £34,241.

Dumbarton Gas-Works.—An endeavour is being made by Messrs. A. M'Millan & Sons, Ltd., shipbuilders, of Dumbarton, to purchase the town gas-works so as to enable the firm to extend their shipbuilding yard, and erect additional workshops. The price offered is said to be £60,000. The proposal is that the Corporation should construct new gas-works at the east end of the town.

Ennis Gas Consumers' Company in Liquidation.—In the High Court of Ireland last week, the Official Liquidator of the Ennis Gas Consumers' Company applied to Mr. Justice Gordon for liberty to borrow £500 from the Provincial Bank for the purchase of coal to enable the underaking to be carried on, so that it might be sold as a going concern. He estimated that there were £500 in debts outstanding. Mr. Justice Gordon gave permission, and also authorized proceedings to be taken against defaulting debtors.

Dearer Gas in Edinburgh.—The Edinburgh and Leith Gas Commissioners have increased the price of gas from 5s. to 5s. 8d. per 1000 c.ft. (as compared with the pre-war rate of 2s. 8d.), the advance to take effect as from the next meter readings, and to remain in force for six months. The cost of coal has risen from £118,349 in 1915 to £263,847 for the present year, or 123 p.ct.; workmen's wages have increased from £68,500 to £159,147 (132 p.ct.); the price of materials required for repairs and maintenance has more than doubled; and rates and taxes have gone up by 167 p.ct. In submitting the figures to the Commissioners, the Convener of the Works Committee (Councillor Douglas Elliot) expressed the hope that it might be possible to reduce the price of gas next May.

Manufacturers and Gas Prices at Walsall.—A resolution has been passed by the Walsall Chamber of Commerce "viewing with great concern the increase in the price of gas from 4s. to 5s. per 1000 c.ft., and taking exception in particular to the imposition of a flat-rate applicable to all classes of consumers." Previously, special terms were given to users of gas for power and heating purposes. Mr. S. F. Hawley expressed the opinion that the Chamber should have regard to the difficulties of the Corporation, in view of the heavy loss incurred on the gas undertaking last year. Mr. H. D. Jackson replied that the Corporation were under much less expense in dealing with large consumers, and that if the Gas Committee had to rely on small consumers they would have to increase their charges 25 p.ct.

Reasons for a Higher Price at Hastings.—At the end of July, it was intimated that the price of gas had been provisionally fixed at 5s. per 1000 c.ft. by the Hastings and St. Leonards Gas Company. Unfortunately, this has been found insufficient to meet the increased expenses; and in giving notice of a further increase to 5s. 6d. per 1000 c.ft., Mr. C. F. Botley (the Engineer and General Manager) says the recent award of a Court of Arbitration in addition to the effects of reduced working hours, means a further increase in the cost of labour of over £5000 per annum. The July advance of 6s. per ton, and the enforced substitution of certain railborne coal for seaborne coal (the latter often of inferior quality and subject to excessive sea freights), will result in an addition to the coal bill of approximately £12,000 per annum. Certain repairs which could not be undertaken during the war have now to be dealt with at greatly increased cost; and all stores and appliances are more expensive.

Bridgwater Gas Company.—The full statutory dividends were declared at the annual meeting of the Bridgwater Gas Light Company, when the Directors reported that the quantity of gas sold during the twelve months ended June 30 was 83,100,000 c.ft., or 4,500,000 c.ft. more than the previous year. The Chairman (Mr. R. Y. Foley) remarked that during the war one or two of the employees had been seriously wounded, including the only son of Mr. J. H. Cornish (the Manager and Secretary). But all had happily more or less recovered. If they were forced to take their coal supplies from the Tyne, freight alone would cost 40s. per ton. The Directors during the past year had had to turn down one or two promising schemes of development, on account of the enormous cost. The heavy cost of coal and labour was stimulating the energies of the gas engineers of the country to largely increase the volume of gas obtained from the coal carbonized; and if the experiments in this direction proved successful, the public might again look forward to cheaper gas. But it would be based on a calorific standard, and not on illuminating power, which was now relatively of little importance. Legislation would probably shortly be introduced with this end in view; and it was likely that at the same time the financial disabilities would also receive attention at the hands of Parliament.

By the sale of Duckworth Field Mill, the Blackburn Corporation realized £8221. They are now applying for the permission of the Ministry of Health to devote this amount towards meeting capital expenditure incurred for improvements at the Greenbank Gas-Works.

Lecturing before chemical engineers at the Huddersfield Technical College, Dr. W. B. Davidson, of British Dyes, Ltd., pointed out the foolishness of the British prejudice in favour of the open fire, from which not more than 20 p.ct. heat efficiency is obtained. The highest efficiency from the gas-fire, he said, is 70 p.ct., and the average 60 p.ct. In his own house, during the past eight or ten years, he has used almost entirely coke, instead of coal. Coke could be burnt very successfully with properly designed fire-places. It was essential that there should be a deep fire and wide bars.

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